ORDER NO. HAD8602336C0
A2

Service Manual

06070586 91002937 09
SM-RSB105 1 ST
SVC MNL .. DOM

Cassette Deck

Dolby NR-Equipped Stereo Cassette Deck

RS-B105

DOLBY SYSTEM

Color

(K)...Black Type
(S)...Silver Type

Color	Areas
(K) (S)	[M].....U.S.A.
(K) (S)	[E].....All European areas except United Kingdom.
(K) (S)	[EK].....United Kingdom.
(K) (S)	[EGA] ....F.R. Germany.

RS-D550W MECHANISM SERIES

SPECIFICATIONS

Deck system	Stereo cassette deck
Track system	4-track, 2-channel
Heads	
REC/PLAY	MX head
Erasing	Double-gap ferrite head
Motor	1 motor system
Recording system	AC bias
Bias frequency	50kHz
Erasing system	AC bias
Tape speed	4.8cm/sec. (1-7/8ips.)
Frequency response	
Metal	20Hz~16,000Hz
	30Hz~15,000Hz (DIN)
	40Hz~15,000Hz±3dB
CrO_2	20Hz~15,000Hz
	30Hz~15,000Hz (DIN)
	40Hz~14,000Hz±3dB
Normal	20Hz~15,000Hz
	30Hz~15,000Hz (DIN)
	40Hz~14,000Hz±3dB
S/N (Signal level = max. recording level, CrO_2 type tape)	
Dolby NR in	66dB (CCIR)
NR out	56dB (A weighted)

Wow and flutter	0.08% (WRMS) ±0.2% (DIN)
Fast forward and rewind time	Approx. 105 seconds with C-60 cassette tape
Input sensitivity and impedance	
MIC	0.25mV/400Ω~10kΩ
LINE	60mV/47kΩ
DIN...[EGA] only	0.25mV/3.3kΩ
Output voltage and impedance	
LINE	400mV/3.2kΩ
Power consumption	9W
Power supply [M]	AC 60Hz 120V
[E] [EGA]	AC 50Hz/60Hz 220V
[EK]	AC 50Hz/60Hz 240V
Dimensions (W×H×D)	430×115×220mm (16-15/16"×4-17/32"×8-21/32")
Weight	3.0kg (6.6lbs.)

* Dolby noise reduction manufactured under license from Dolby Laboratories Licensing Corporation.
"Dolby" and the double-D symbol are trade marks of Dolby Laboratories Licensing Corporation.

Technics

Matsushita Services Company
50 Meadowland Parkway.
Secaucus, New Jersey 07094

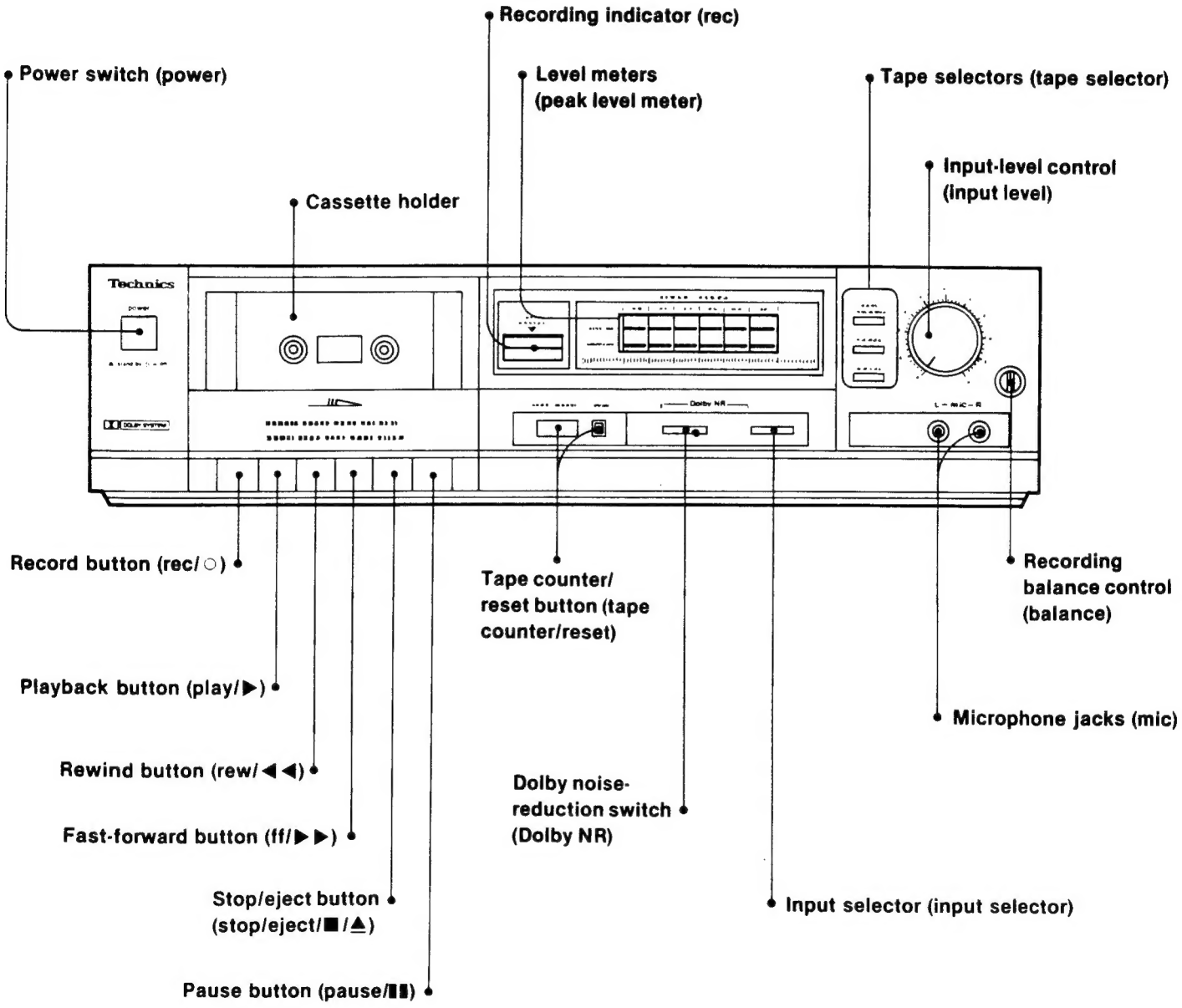
Panasonic Sales Company, Division of Matsushita Electric of Puerto Rico, Inc.
Ave. 65 De Infanteria, KM 9.7
Victoria Industrial Park
Carolina, Puerto Rico 00630

Panasonic Hawaii Inc.
91-238 Kauhi St. Ewa Beach
P.O. Box 774
Honolulu, Hawaii 96808-0774

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

■ CONTENTS

■ LOCATION OF CONTROLS



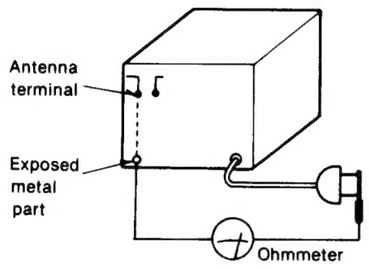
■ SAFETY PRECAUTION (This "safety precaution" is applied only in U.S.A.)

1. Before servicing, unplug the power cord to prevent an electric shock.
2. When replacing parts, use only manufacturer's recommended components for safety.
3. Check the condition of the power cord. Replace if wear or damage is evident.
4. After servicing, be sure to restore the lead dress, insulation barriers, insulation papers, shields, etc.
5. Before returning the serviced equipment to the customer, be sure to make the following insulation resistance test to prevent the customer from being exposed to a shock hazard.

• INSULATION RESISTANCE TEST

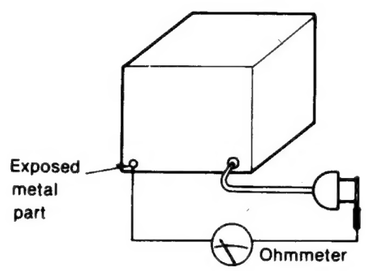
1. Unplug the power cord and short the two prongs of the plug with a jumper wire.
2. Turn on the power switch.
3. Measure the resistance value with ohmmeter between the jumpered AC plug and each exposed metal cabinet part, such as screwheads antenna, control shafts, handle brackets, etc. Equipment with antenna terminals should read between 3MΩ and 5.2MΩ to all exposed parts. (Fig. A) Equipment without antenna terminals should read approximately infinity to all exposed parts. (Fig. B)

Note: Some exposed parts may be isolated from the chassis by design. These will read infinity.



(Fig. A)

Resistance = 3MΩ—5.2MΩ



(Fig. B)

Resistance = Approx ∞

4. If the measurement is outside the specified limits, there is a possibility of a shock hazard. The equipment should be repaired and rechecked before it is returned to the customer.

■ OPERATION

Dolby noise-reduction system

Noise-reduction systems are designed to reduce the annoying characteristic "hiss" noise during playback by recording on the tape by the noise-reduction system.
When the recording is made, the level of high frequency signals is raised, and then this level is lowered during playback, thus effectively reducing high-frequency noise and expanding the dynamic range.
This unit uses the Dolby B-type of noise-reduction systems.

• The B-type Dolby noise-reduction performs this function in the high frequency range.

■ Examples of uses of the noise-reduction systems

Dolby B system
Use this system for playback of tapes which were recorded by the conventional Dolby noise-reduction system.

■ DISASSEMBLY INSTRUCTIONS

Ref. No. 1 — How to remove the cabinet

Procedure 1

• Remove the 4 screws (❶~❹).

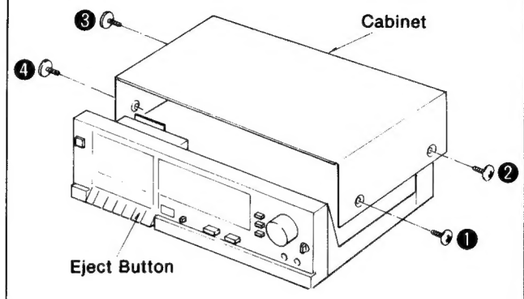


Fig. 1

Ref. No. 2 — How to remove the mechanism unit

Procedure 1→2

1. Push the eject button (see fig. 1).
2. Remove the 4 screws (❶~❹).
3. Remove the counter belt.

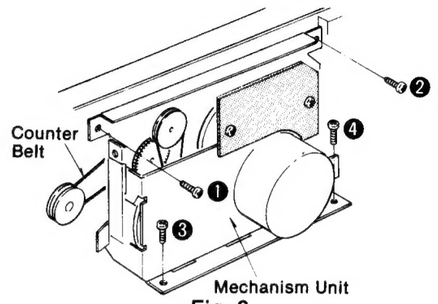


Fig. 2

Ref. No. 3 — How to remove the LED meter P.C.B.

Procedure 1→3

1. Remove the 2 screws (❶, ❷).
2. Remove the 4 tabs aside.

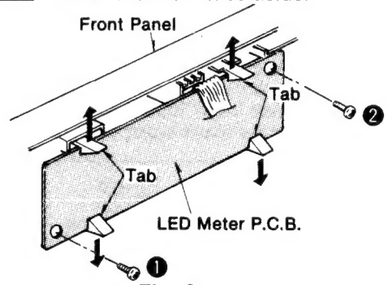


Fig. 3

Ref. No. 4 — How to remove the volume P.C.B.

Procedure 1→4

1. Remove the 2 screws (❶, ❷).
2. Pull out the volume knob.

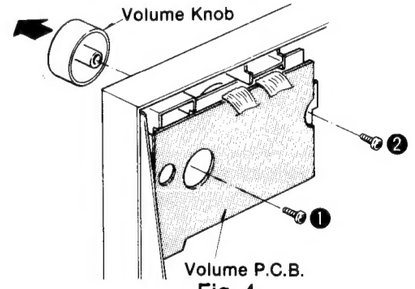


Fig. 4

Ref. No. 5 — How to remove the front panel

Procedure 1→2→3→4→5

• Remove the 4 screws (❶~❹).

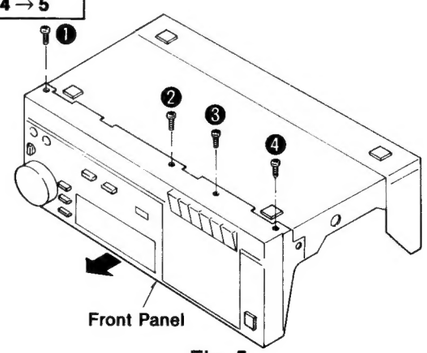


Fig. 5

Ref. No. 6 — How to remove the main P.C.B.

Procedure 1→6

1. Remove the 2 screws (❶, ❷).
2. Open the 2 tabs aside, and then pull down the back chassis.

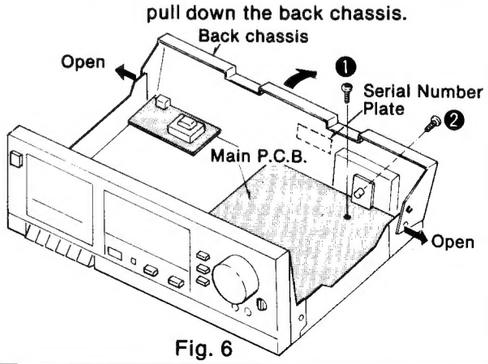


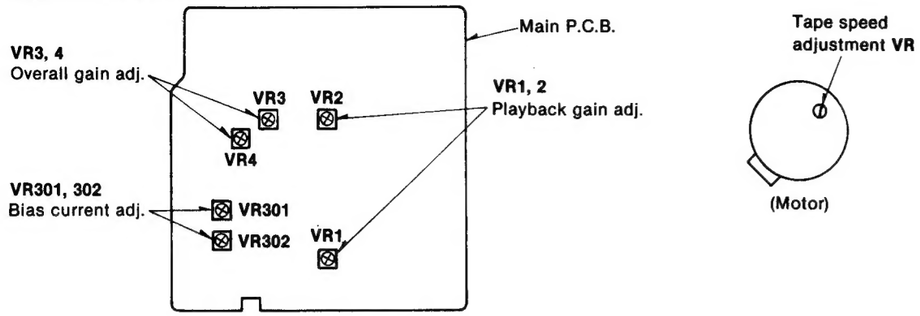
Fig. 6

*** Serial No. Indication**

• The serial number plate of this product is attached to the back chassis (shown in fig. 6).

■ MEASUREMENTS AND ADJUSTMENTS

Adjustment point



Measurement Condition

- Input level controls; Maximum
- Balance controls; Center
- Tape select switch; Normal
- Dolby NR switch; Out
- Make sure heads are clean
- Make sure capstan and pressure roller are clean.
- Judgeable room temperature 20±5°C (68±9°F)

Measuring instrument

- EVM (Electronic Voltmeter)
- Oscilloscope
- Digital frequency counter
- AF oscillator
- ATT (Attenuator)
- DC voltmeter
- Resistor (600Ω)

Test tape

- Head azimuth adjustment (8kHz, −20dB); QZZCFM
- Tape speed adjustment (3kHz, −10dB); QZZCWAT
- Playback frequency responce (315Hz, 12.5kHz, 10kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz, 63Hz, −20dB); QZZCFM
- Playback gain adjustment (315Hz, 0dB); QZZCFM
- Overall frequency response, Overall gain adjustment
  - Normal reference blank tape; QZZCRA
  - CrO_2 reference blank tape; QZZCRX
  - Metal reference blank tape; QZZCRZ

Head azimuth adjustment

1. Test equipment connection is shown in Fig. 1.
2. Playback the azimuth adjusted part (8kHz, −20dB) of the test tape (QZZCFM) and regulate the angle adjusting screw so that the outputs of L-CH and R-CH are maximized. (When the adjusting positions are different with L-CH and R-CH, find a position where the outputs of L-CH and R-CH are balanced, and then make the adjustment.)
3. At the same time, draw a lissajous waveform and eliminate phase deflection.
4. After adjustment, lock the tape guide height and angle adjustment screws.

Fig. 2

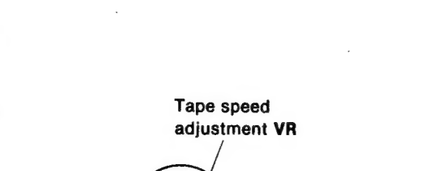


Fig. 1

Tape speed adjustment

1. Test equipment connection is shown in Fig. 3.
2. Playback the middle part of the test tape (QZZCWAT).
3. Adjust the VR in the motor so that the output is within the standard.

Standard value: 3000±20Hz

Fig. 3

Playback frequency response

1. Test equipment connection is shown in Fig. 4.
2. Playback the playback frequency response part (315Hz, 12.5kHz~63kHz, −20dB) of the test tape (QZZCFM).
3. Chech that the frequency is within the range shown in Fig. 5 for both L-CH and R-CH.

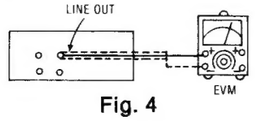


Fig. 4

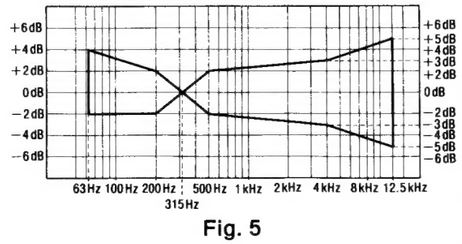


Fig. 5

Playback gain adjustment

1. Test equipment connection is shown in Fig. 4.
2. Playback the playback gain adjusted part (315Hz, 0dB) of the test tape (QZZCFM).
3. Adjust VR1, (L-CH) {VR2 (R-CH)} so that the output is within the standard.

Standard value: 0.4±0.5dB (0.02V)

Bias current adjustment

1. Test equipment connection is shown in Fig. 6.
2. Set the tape selector switch to the normal position.
3. Insert the normal tape.
4. Press the record and pause buttons.
5. Minimize the input level control and adjust VR301 (L-CH) {VR302 (R-CH)} so that the output between TP1 (L-CH) {TP2 (R-CH)} and ground is within the standard.
6. After that check in the same way as for CrO_2 and metal tape.

Reference value:
9V (Normal)
14V (CrO_2)
17V (Metal)

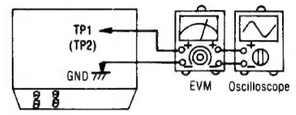


Fig. 6

Overall frequency response

1. Test equipment connection is shown in Fig. 7.
2. Set the tape selector switch to the normal position.
3. Set a normal blank tape (QZZCRA) and record by applying signal (50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz and 10kHz), 20dB attenuated from the reference input level signal (1kHz, −24dB).
4. Playback the signal recorded in step 3, and check that the level of each output frequency is within the range shown in Fig. 8 in comparison with the reference frequency (1kHz).
5. If it is not within the standard range, adjust the bias current by VR301 (L-CH) {VR302 (R-CH)} so that the frequency level is within the standard.
   - Level up in high frequency range.....Increase the bias current.
   - Level down in high frequency range.....Decrease the bias current.
6. After that increase the signal recorded on CrO_2 blank tape (QZZCRX) and metal blank tape (QZZCRZ) up to 12.5kHz and adjust in the same way as mentioned above and check that the frequency level is within the range shown in Fig. 9.

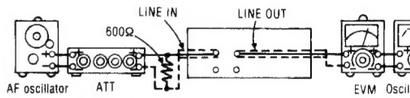


Fig. 7

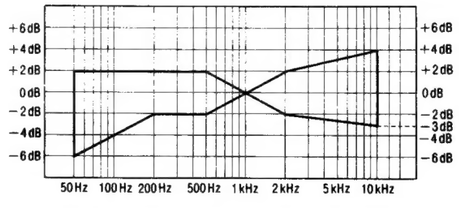


Fig. 8

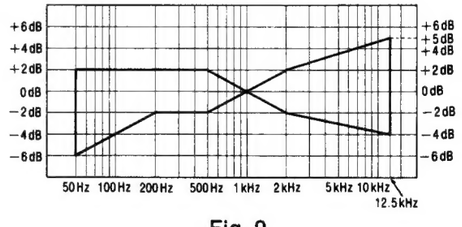


Fig. 9

Overall gain adjustment

1. Test equipment connection is shown in Fig. 7.
2. Set the tape selector switch to the normal position.
3. Set a normal blank tape (QZZCRA) and apply the reference input level signal (1kHz, −24dB) in record pause mode.
4. Adjust the output 0.42V by attenuator and then record.
5. Playback the signal recorded in step 3, and check that the output is within the standard.
6. If it is not within the standard, adjust VR3 (L-CH) {VR4 (R-CH)} and repeat the step (2), (3) and (4) until the output is within the standard.

Standard value: 0.4V±0.05V

Dolby NR circuit

1. Test equipment connection is shown in Fig 10.
2. Set a normal tape and apply 5kHz signal in record pause mode.
3. Adjust by attenuator so that the output between terminal ⑱ (L-CH) {terminal ⑲ (R-CH)} of IC401 and ground is 12.3mV.
4. Turn NR switch ON, and check that the level changes as specified from the level in NR out mode.

Standard value: 8±1.5dB

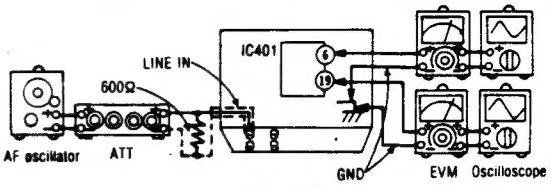


Fig. 10

■ RESISTORS AND CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice. Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. The unit of resistance is OHM (Ω). K=1000Ω, M=1000kΩ
4. The unit of capacitance is MICROFARAD (μF). P=10⁻⁶μF.

Numbering System of Resistor

Resistor Type		Wattage		Tolerance	
ERD	: Carbon	10	: 1/8W	J	: ±5%
ERG	: Metal Oxide	25	: 1/4W	G	: ±2%
ERC	: Solid	2F	: 1/4W	K	: ±10%
		S2	: 1/4W		
		S1	: 1/2W		
		12	: 1/2W		

Area

* [M].....U.S.A.
* [E].....All European areas except United Kingdom.
* [EK].....United Kingdom.
* [EGA] ...F.R. Germany.

Numbering System of Capacitor

Capacitor Type		Voltage: ECEA Type		Voltage: Other		Tolerance	
ECEA...N	: Non-polar Electrolytic	2R3	: 2.3V	05	: 50V DC	C	: ±0.25pF
ECEA	: Electrolytic		DC	1H	: 50V DC	J	: ±5%
ECCD	: Ceramic	OJ	: 6.3V	1	: 125V DC	K	: ±10%
ECKD	: Ceramic	1C	: 16V	2H	: 500V DC	Z	: +80%, −20%
ECQM	: Polyester	1E	: 25V	KC	: 400V AC	M	: ±20%
ECQV	: Polyester	1V	: 35V				
ECQP	: Polyester	1H	: 50V				
EECW	: Liquid electrolyte double layer capacitor	50	: 50V				
		25	: 25V				
		2A	: 100V				
ECKF	: Ceramic						

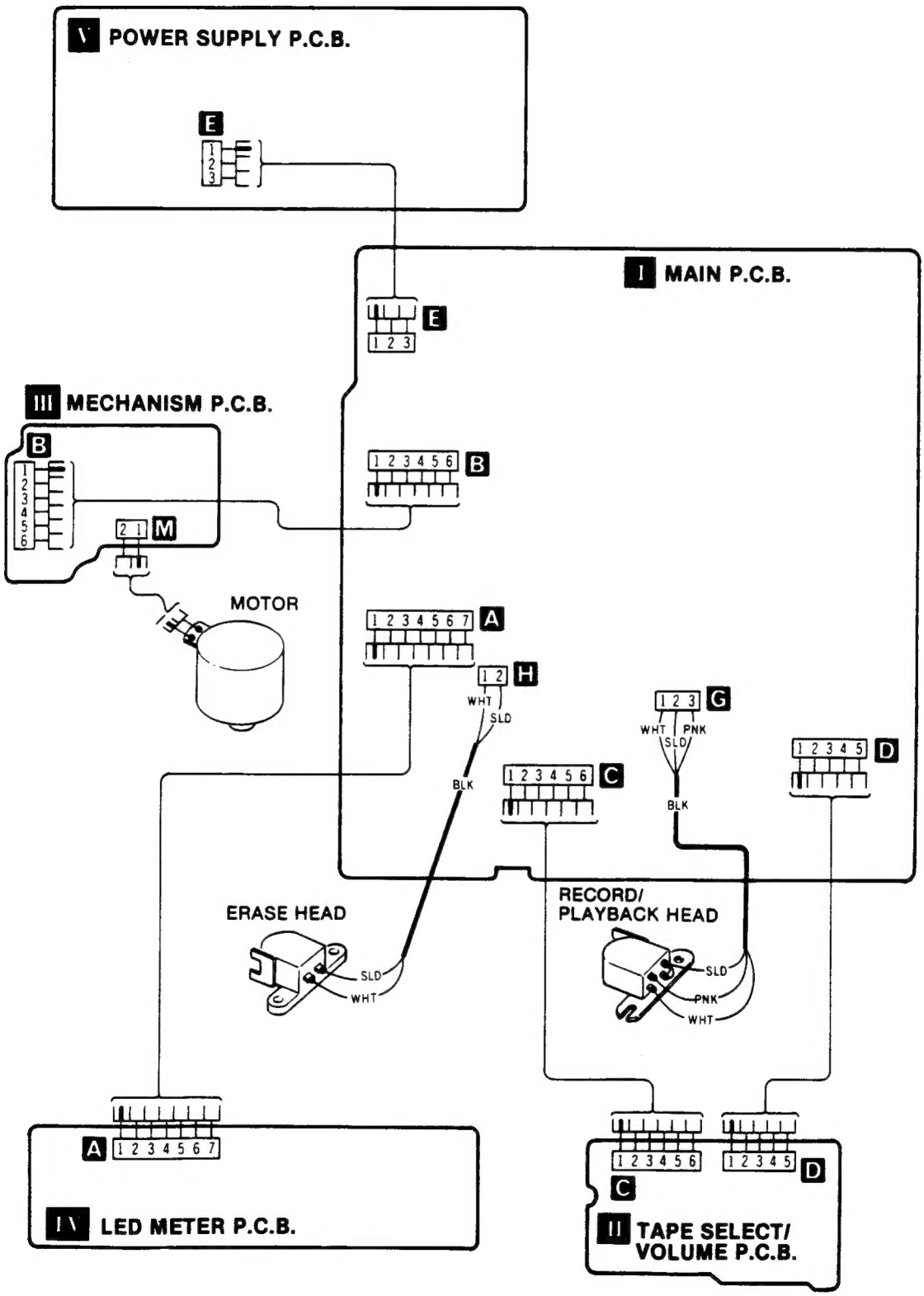
• RESISTORS

Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
R 1, 2	ERDS2TJ273	27k	R 49, 50	ERDS2TJ272	2.7k	R 403, 404	ERDS2TJ471	470	R 705	ERDS2TJ472	4.7k
R 3, 4			R 51, 52	ERDS2TJ222	2.2k	R 405, 406	ERDS2TJ473	47k	R 706, 707	ERDS2TJ154	150k
[EGA] only	ERDS2TJ332	3.3k				R 407, 408	ERDS2TJ562	5.6k	R 708	ERDS2TJ152	1.5k
R 7, 8	ERDS2TJ473	47k	R 53, 54	ERDS2TJ183	18k	R 409, 410	ERDS2TJ332	3.3k	R 802	ERDS2TJ473	47k
R 11, 12	ERDS2TJ102	1k	R 55, 56	ERDS2TJ391	390	R 411, 412	ERDS2TJ102	1k	R 803	ERDS2TJ103	10k
R 17, 18	ERDS2TJ472	4.7k	R 57, 58	ERDS2TJ391	390				R 804	ERDS2TJ683	68k
R 19, 20	ERDS2TJ101	100	R 61, 62	ERDS2TJ182	1.8k	R 413, 414	ERDS2TJ274	270k	R 807	ERDS2TJ562	5.6k
R 23, 24	ERDS2TJ101	100	R 63, 64	ERDS2TJ154	150k	R 415, 416	ERDS2TJ184	180k	R 815, 816	ERDS2TJ103	10k
R 25, 26	ERDS2TJ225	2.2M	R 69, 70	ERDS2TJ103	10k	R 417, 418	ERDS2TJ152	1.5k	R 818	ERDS2TJ102	1k
R 29, 30	ERDS2TJ820	82				R 419	ERDS2TJ512	5.1k			
R 31, 32	ERDS2TJ334	330k	R 81, 82			R 600, 601 ⚠	ERDS2TJ102	1k	R 900	ERDS2TJ392	3.9k
			[EGA] only	ERDS2TJ182	1.8k	R 604, 605			R 901	ERDS2TJ391	390
R 33, 34	ERDS2TJ682	6.8k	R 200	ERDS2TJ271	270	[EK] only ⚠	ERQ14LKR56	0.56	R 902		
R 35, 36	ERDS2TJ562	5.6k	R 201	ERDS2TJ680	68	R 606, 607			[EK] only	ERD2FCJ4R7	4.7
R 37, 38	ERDS2TJ102	1k				[EK] only ⚠	ERQ14LK2R2	2.2			
R 39, 40	ERDS2TJ103	10k	R 202	ERD2FCG270	27	R 700	ERDS2TJ561	560			
R 41, 42	ERDS2TJ222	2.2k	R 300, 301	ERDS2TJ8R2	8.2	R 701	ERDS2TJ562	5.6k			
R 43, 44	ERDS2TJ153	15k	R 302, 303	ERDS2TJ683	68k	R 702	ERDS2TJ472	4.7k			
R 45, 46	ERDS2TJ273	27k	R 304	ERDS2TJ1R0	1						
R 47, 48	ERDS2TJ682	6.8k	R 401, 402	ERDS2TJ242	2.4k	R 703, 704	ERDS2TJ363	36k			

• CAPACITORS

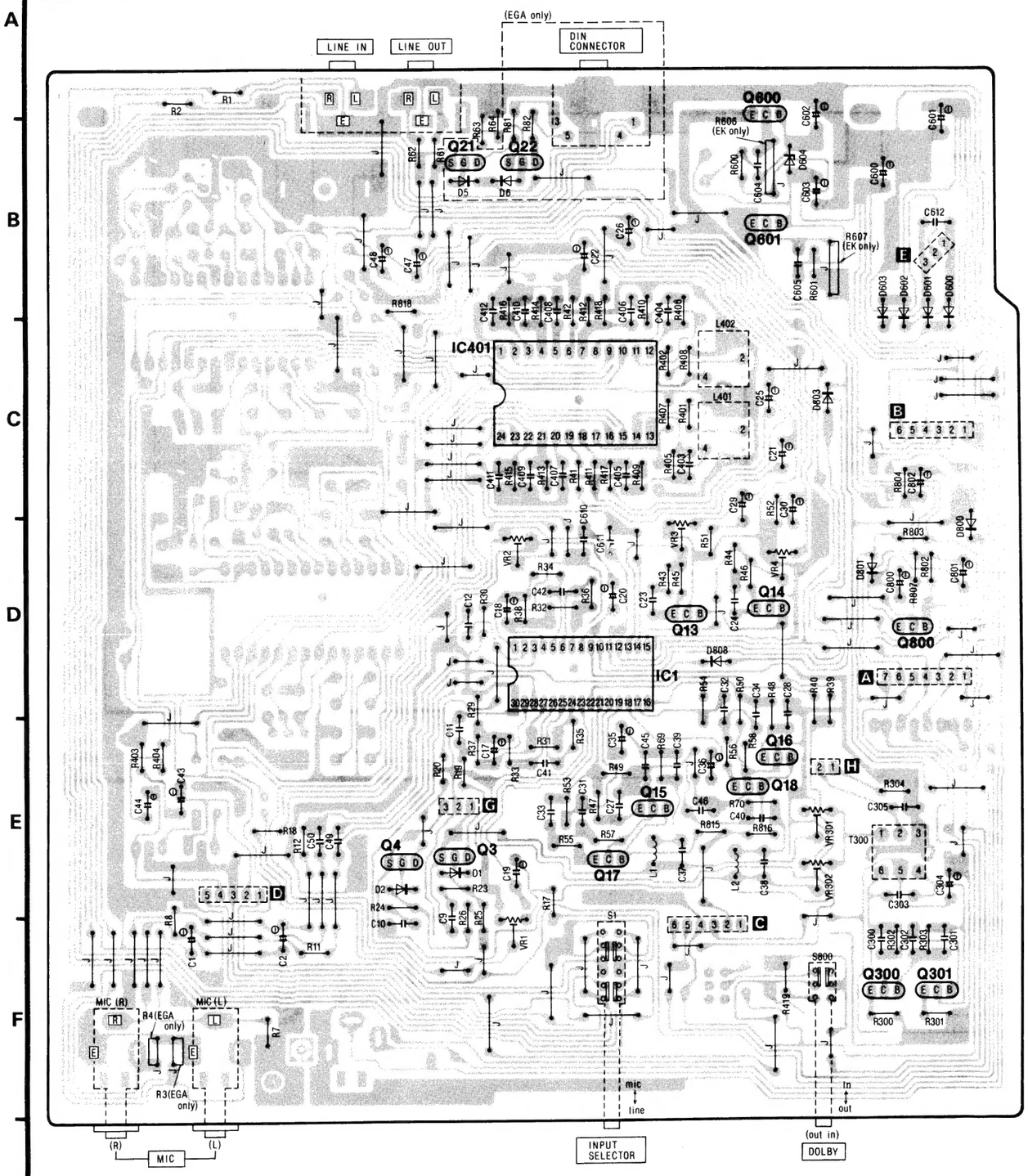
Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value	Ref. No.	Part No.	Value
C 1, 2	ECEA1CU100	10	C 35, 36	ECEA1HU010	1	C 403, 404	ECQB1H472JZ	0.0047	C 612 ⚠	ECKD2H682PE	0.0068
C 9, 10	ECKD1H122KB	0.0012	C 37, 38	ECKD2H331KB	330p	C 405, 406	ECQV1H333JZ	0.033	C 701, 702	ECEA1HU2R2	2.2
C 11, 12	ECKD1H681KB	680p	C 39, 40	ECKD1H122KB	0.0012	C 407, 408	ECQM1H473JZ	0.047	C 703	ECKD1H223ZF	0.022
C 17, 18	ECEA0JU101	100	C 41, 42	ECQB1H103JZ	0.01				C 800	ECEA1CU331	330
C 19, 20	ECEA1CU100	10	C 43, 44	ECEA1HU010	1	C 409, 410	ECQV1H334JZ	0.33			
C 21, 22	ECEA1CU100	10	C 47, 48	ECEA1CU100	10	C 411, 412	ECQV1H104JZ	0.1	C 801	ECEA1CU331	330
C 23, 24	ECQB1H472JZ	0.0047	C 49, 50	ECKD1H102KB	0.001				C 802	ECEA1EU470	47
C 25, 26	ECEA1HU010	1	C 300, 301	ECFR1E222KAY	0.0022	C 600 ⚠	ECEA1AU332	3300			
C 27, 28	ECQB1H682JZ	0.0068				C 601 ⚠	ECEA1AU102	1000			
C 29, 30	ECEA1HU010	1	C 302	ECFD1H682KD	0.0068	C 602 ⚠	ECEA0JU101	100			
			C 303	ECKD1H332KB	0.0033	C 603 ⚠	ECEA0JU471	470			
C 31, 32	ECQB1H222JZ	0.0022	C 304	ECEA1CU101	100	C 604, 605 ⚠	ECKD1H223ZF	0.022			
C 33, 34	ECQB1H822JZ	0.0082	C 305	ECQP1393JZ	0.039	C 610, 611 ⚠	ECKD1H222ZF	0.022			

■ PRINTED CIRCUIT BOARDS WIRING CONNECTION DIAGRAM

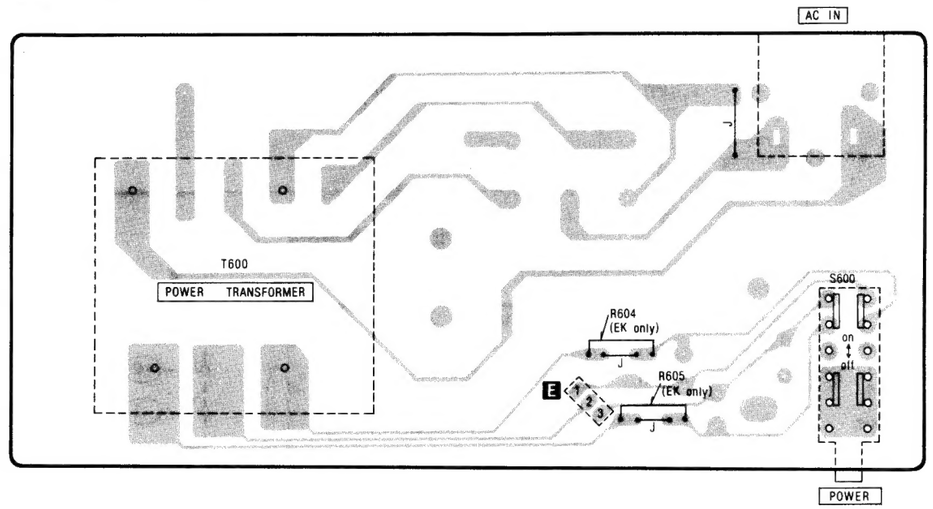


■ PRINTED CIRCUIT BOARDS

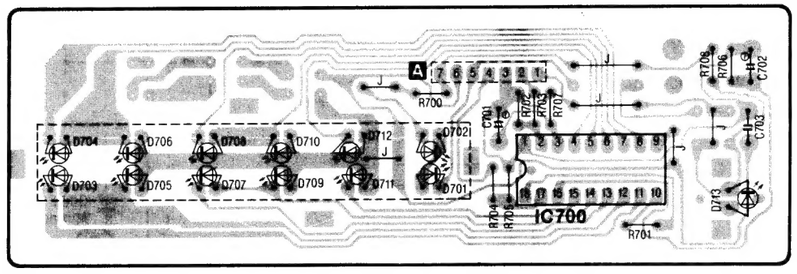
I MAIN P.C.B.



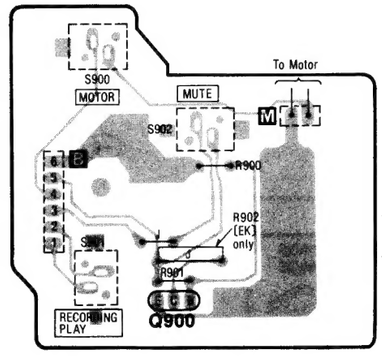
V POWER SUPPLY P.C.B.



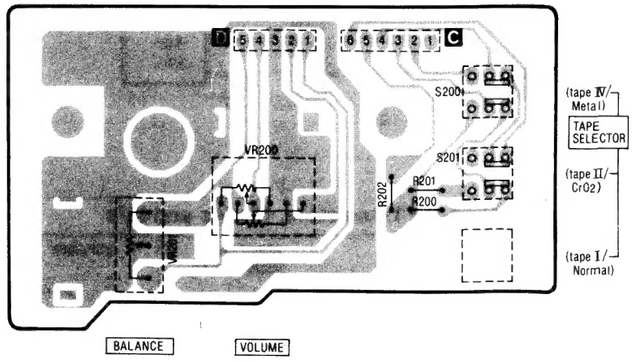
IV LED METER P.C.B.



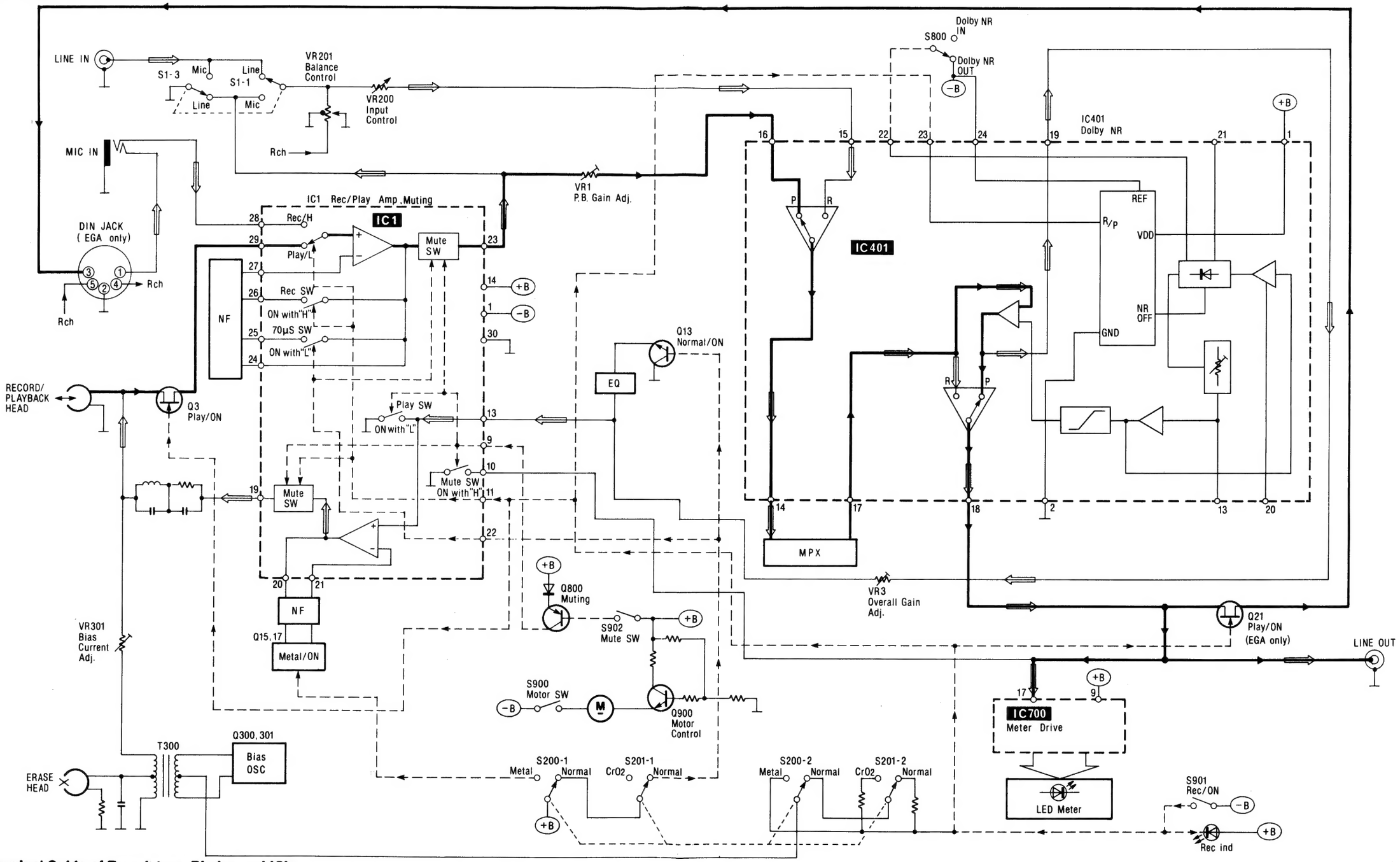
III MECHANISM P.C.B.



II TAPE SELECTOR/VOLUME P.C.B.



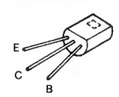
■ BLOCK DIAGRAM



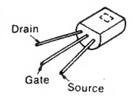
• Terminal Guide of Transistors, Diodes and IC's

AN6888	18 Pin
NE657N	24 Pin
AN7014K	30 Pin

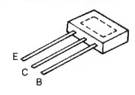
2SB621ARS
2SD592AQRS



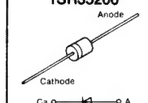
2SK246Y



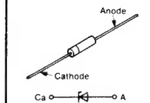
2SC3311AQS
2SA1309AQS



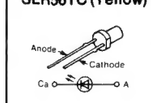
MA165
1SR35200



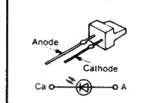
MA4120M



SLR56URC (Red)
SLR56YC (Yellow)



LN846RP



NOTES:
(▬▶): Playback signal
(▭▷): Recording signal
(▬▶▬): Control signal

■ ELECTRICAL PARTS LIST

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.

Area

* [M].....U.S.A.
* [E].....All European areas except United Kingdom.
* [EK].....United Kingdom.
* [EGA] ...F.R. Germany.

Ref. No.	Part No.	Part Name & Description
INTEGRATED CIRCUITS		
IC 1	AN7014K	Integrated Circuit
IC 401	NE657N	Integrated Circuit
IC 700	AN6888	Integrated Circuit
TRANSISTORS		
Q 3, 4	2SK246Y	FET
Q 13, 14, 15, 16, 17, 18	2SC3311-Q	Transistor
Q 21, 22 [EGA] only	2SK246Y	FET
Q 23, 24	2SD1330R	Transistor
Q 300, 301	2SC3311-Q	Transistor
Q 600	2SD592ANC-Q	Transistor
Q 601	2SB621A-R	Transistor
Q 800	2SA1309Q	Transistor
Q 900	2SD592ANC-Q	Transistor
DIODES & RECTIFIERS		
D 1, 2	MA165	Diode
D 5, 6 [EGA] only	MA165	Diode
D 600, 601, 602, 603	1SR35200	Diode
D 604	MA4120-M	Diode
D 701, 702	SLR56YC	LED
D 703, 704, 705, 706, 707, 708	SLR56URC	LED
D 709, 710, 711, 712	SLR56YC	LED
D 713	LN846RP	LED
D 800, 801, 803, 808	MA165	Diode
VARIABLE RESISTORS		
VR 1, 2	EVND4AA00B24	P.B. Gain Adj. VR
VR 3, 4	EVND4AA00B54	Overall Gain Adj. VR
VR 200	EWC5SA000A54	Input Level Control
VR 201	EWHFDAF15G15	Balance Control
VR 301, 302	EVND4AA00B15	Bias Current Adj. VR
COILS		
L 1, 2	QLQX0343KWA	Bias Trap Coil
L 401, 402	SLM1C89-K	MPX Coil
TRANSFORMERS		
T 300	SL09C19-K	Bias Oscillation Coil
T 600 [EK] ⚠	SLT5K236SA	AC Power Transformer
T 600 [E] [EGA] ⚠	SLT5K235SA	AC Power Transformer
T 600 [M] ⚠	SLT5K237SA	AC Power Transformer

Ref. No.	Part No.	Part Name & Description
SWITCHES		
S 1, 800	SSH2097	Push Switch (Line/Mic Selector/ Dolby NR IN/OUT Selector)
S 200, 201	SSH3700	Push Switch (Metal/CrO_2 Tape Selector)
S 600 ⚠	SSH1069	Push Switch (Power ON/OFF Selector)
S 900	SSP83	Leaf Switch (Motor Switch)
S 901	SSP83	Leaf Switch (Play Switch)
S 902	SSP83	Leaf Switch (Mute Switch)
JACKS		
J 1	QJA0454ZC	Mic Jack
J 3 [EGA] only	SJS6515	DIN Jack

■ SCHEMATIC DIAGRAM

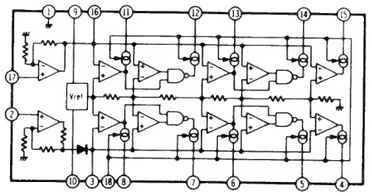
Notes:
(This schematic diagram may be modified at any time with the development of new technolgy.)
* This is the basic circuit diagram of this unit.
Note that part of the circuit is subject to change depending on the areas.
- **S1-1~S1-4** : Line/mic select switch in "**line**" position.
- **S200, S201** : Tape select switch in "**Normal**" position. (S200 ▬: Metal, S201 ▬: CrO_2, S200, S201 ■: Normal)
- **S600** : Power switch in "**on**" position.
- **S800** : Dolby NR in/out select switch in "**out**" position.
- **S900** : Motor switch in "**off**" position.
- **S901** : Play switch in "**off**" position.
- **S902** : Mute switch in "**off**" position.
- Resistance are in ohms (Ω), 1/4 watt unless specified otherwise. 1K=1,000(Ω), 1M=1,000k(Ω)
- Capacity are in micro-farads (μF) unless specified otherwise.
- All voltage values shown in circuitry are under no signal condition and playback mode with volume control at minimum position otherwise specified.
( ).....Voltage values at record mode.
CrO_2.....Voltage values at CrO_2 tape mode.
Metal .....Voltage values at Metal tape mode.
B.....Voltage values at Dolby NR mode.
For measurement use EVM.
- (———) indicates B (bias).
- (▒▒▒) indicates the flow of the playback signal.
- (⟹) indicates the flow of the record signal.
- Important safety notice ⚠
The shaded area on this schematic diagram incorporates special features important for protection from fire and electrical shock hazards.
When servicing it is essential that only manufacturer's specified parts be used for the circuit components in the shaded areas of the schematic.

* Caution !

IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.
* Cover the parts boxes made of plastics with aluminum foil.
* Ground the soldering iron.
* Put a conductive mat on the work table.
* Do not touch the legs of IC or LSI with the fingers directly.

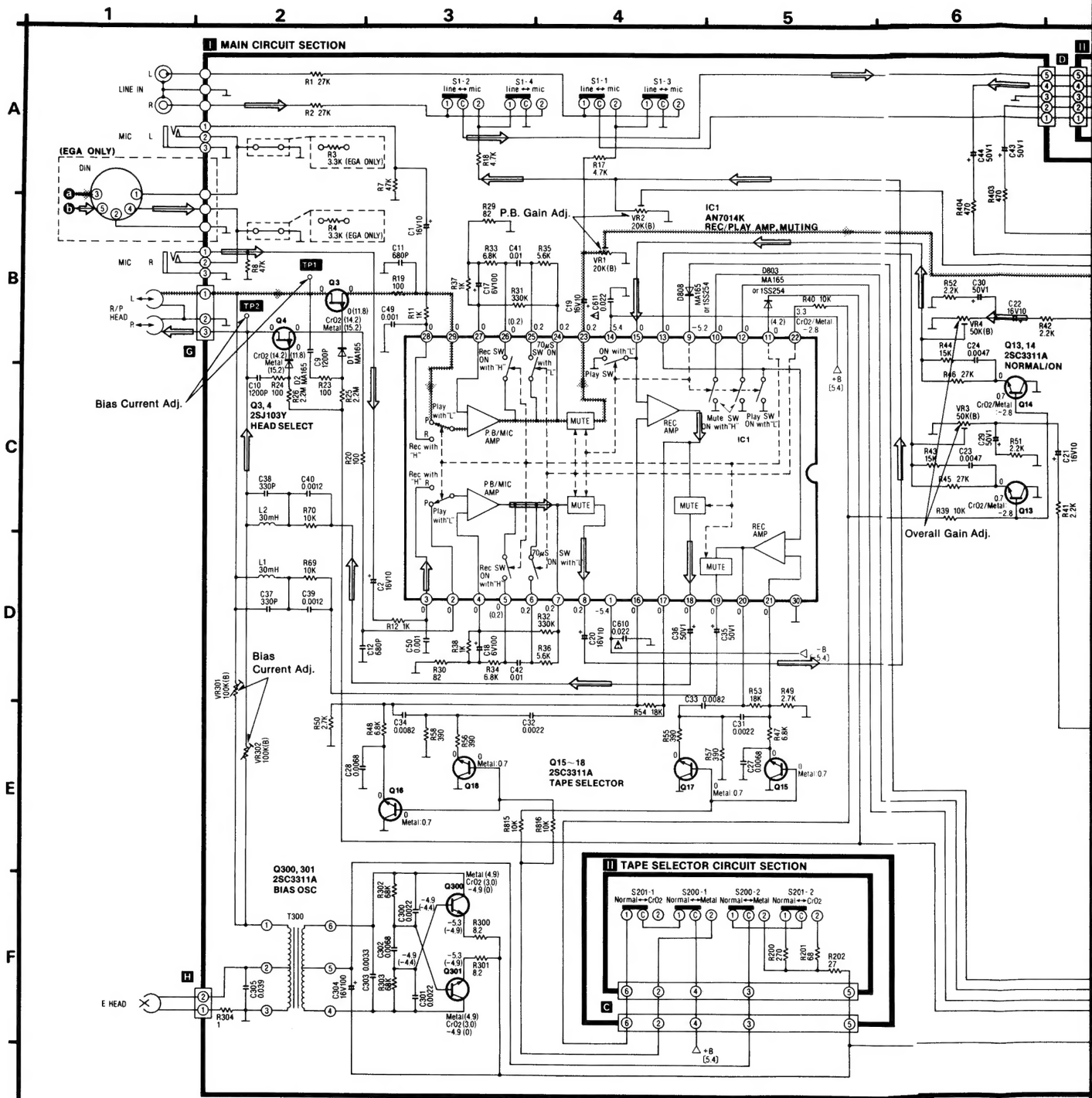
■ EQUIVALENT CIRCUIT

IC700: AN6888



SPECIFICATIONS * Input level control ...MAX

Playback S/N ratio * Test tape...QZZCFM	Greater than 45dB
Overall distortion * Test tape ...QZZCRA for Normal ...QZZCRX for CrO_2 ...QZZCRZ for Metal	Normal..... Less than 3.5% CrO2, Metal..... Less than 4%
Overall S/N ratio * Test tape...QZZCRA	Greater than 43dB (without NAB filter)



3 4 5 6 7 8 9 10 11 12 13 14

II VOLUME CIRCUIT SECTION

Balance Control

Input Volume Control

Overall Gain Adj.

P.B. Gain Adj.

IC1
AN7014K
REC/PLAY AMP, MUTING

Q13, 14
2SC3311A
NORMAL/ON

Q15~18
2SC3311A
TAPE SELECTOR

IC401
NE657N
DOLBY NR

(EGA ONLY)

Q21, 22
2SJ103Y
PLAY/ON

IC4
M5218L
HEADPHONES AMP

LINE OUT

IV LED METER CIRCUIT SECTION

IC700
AN6888
METER DRIVE

II TAPE SELECTOR CIRCUIT SECTION

Q800
2SA1309
MUTING

III MECHANISM CIRCUIT SECTION

Q900
2SD592A
MOTER CONTROL

V POWER SUPPLY CIRCUIT SECTION

Q600, 601
2SB621
REGULATOR

■ MECHANICAL PARTS LOCATION

NOTES:

- When changing mechanism parts. apply the specified grease to the are marked "××" shown in the drawing "Mechanical Parts Location".

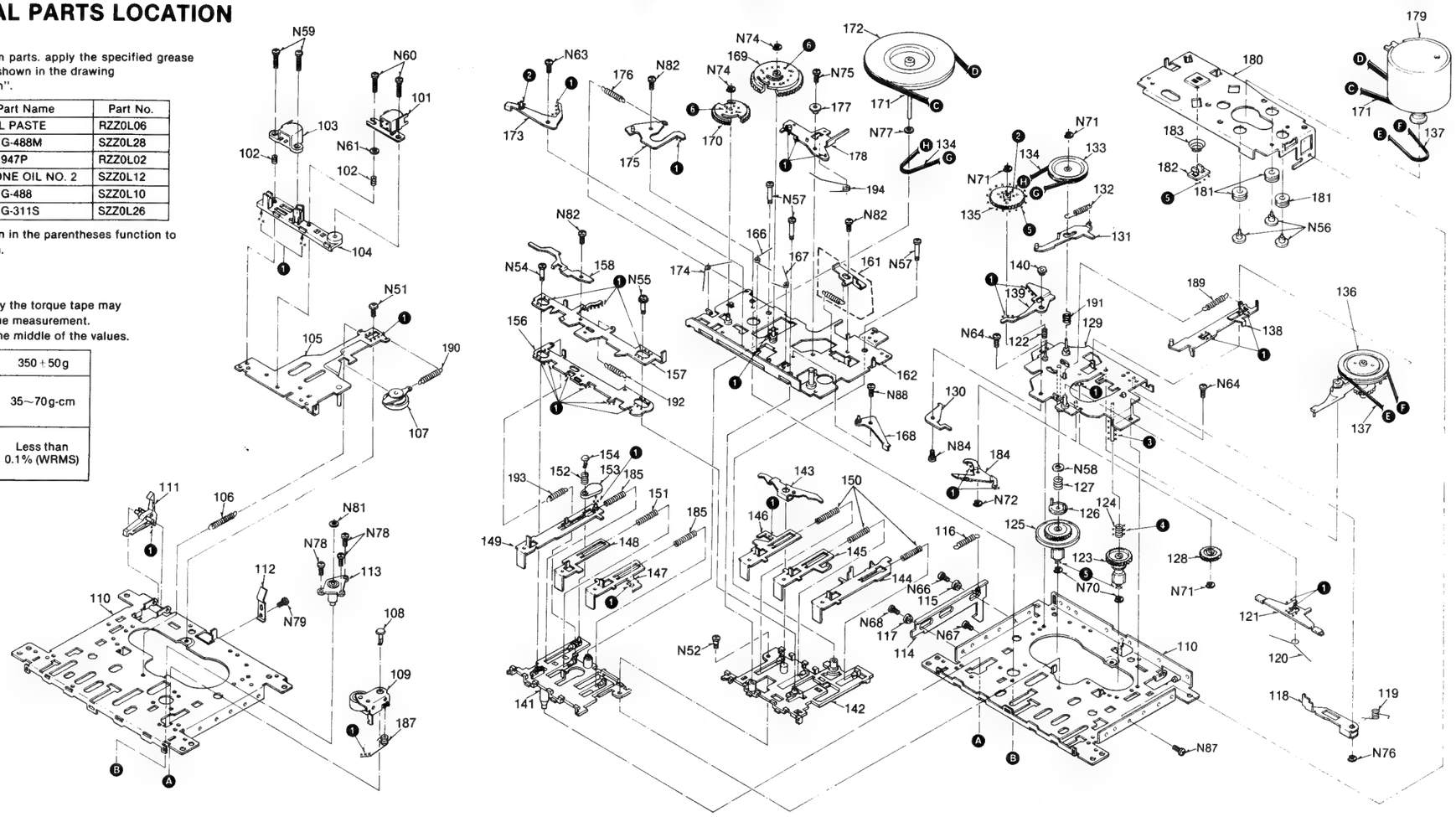
Ref. No.	Part Name	Part No.
●	ROCOL PASTE	RZZ0L06
●	FLOIL G-488M	SZZ0L28
●	FLOIL 947P	RZZ0L02
●	SILICONE OIL NO. 2	SZZ0L12
●	FLOIL G-488	SZZ0L10
●	FLOIL G-311S	SZZ0L26

- The grease and/or oil shown in the parentheses function to prevent friction (lubrication).

SPECIFICATIONS

NOTE: The value indicated by the torque tape may fluctuate during torque measurement. In that case, obtain the middle of the values.

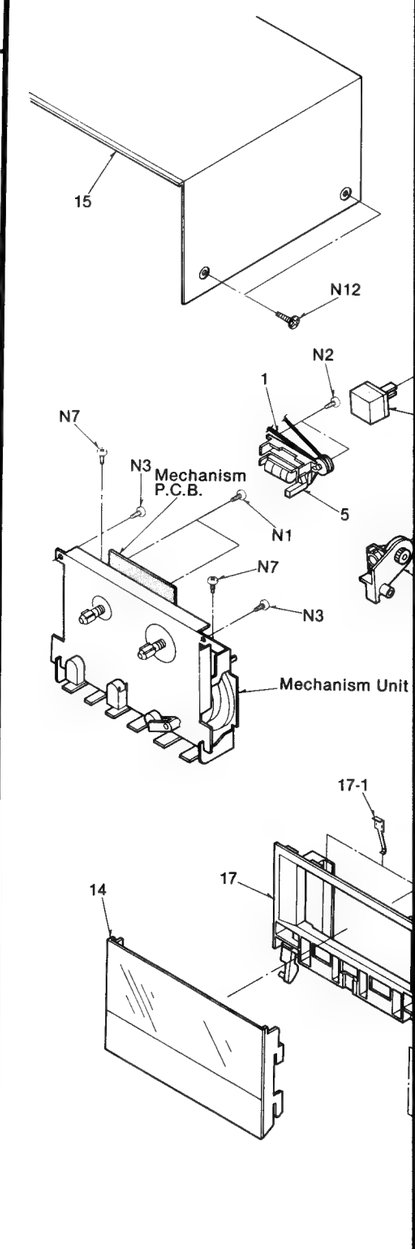
Pressure of pressure roller	350 ± 50g
Takeup tension * Use cassette torque meter.....QZZSRKCT	35~70g-cm
Wow and flutter; (JIS) * Use test tape .....QZZCWAT	Less than 0.1% (WRMS)

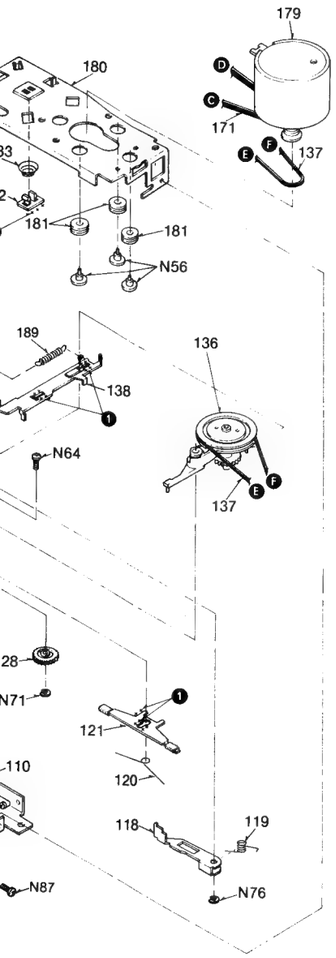


REPLACEMENT PARTS LIST

Ref. No.	Part No.	Part Name & Description	
MECHANISM PARTS			
101	QWY4165G	R.P Head	(1)
102	SMQ4596	Head Spring	(2)
103	QWY2138G	E Head	(1)
104	SMQ4768	Head Base	(1)
105	RFD135Z	Head Panel Ass'y	(1)
106	SMQ4770	Head Panel Spring	(1)
107	SMQ4772	Take Up Roller Shaft Ass'y	(1)
108	SMQ4774	Function Lever Stopper	(1)
109	SMQ4776−1	Pinch Roller Arm Ass'y	(1)
110	SMQT1458	Chassis	(1)
111	SMQ4778	REC Safety Lever	(1)
112	SMQ4780	Pack Hold Spring	(1)
113	SMQ4782	Flywheel Metal	(1)
114	RFY183Z	Eject Slider Lever	(1)
115	SMQ4786	Collar	(1)
116	SMQT1629	E.H, Base Spring	(1)
117	SMQ4788	Collar	(1)
118	SMQ4790	Control Lever	(1)
119	RFS379Z	Control Lever Spring	(1)
120	SMQ4792	Spring	(1)
121	SMQ4794	Brake Arm Ass'y	(1)
122	SMQT1630	Cam Gear Spring	(1)
123	SMQ4800	Supply Reel Ass'y	(1)
124	SMQT1636	Back Tension Spring	(1)
125	SMQ4804	Take Up Reel Ass'y	(1)
126	SMQ4806	Sensing Piece	(1)
127	SMQ4808	Sensing Piece Spring	(1)
128	SMQ4810	FF. Gear	(1)
129	RFU16Z	Reel Base Ass'y	(1)
130	SMQ4814	T. Roller Kick Lever	(1)
131	SMQ4818	Sensing Lever	(1)
132	SMQ4820	Sensing Lever Spring	(1)
133	SMQ4822	Pully	(1)
134	SMQ4824	Full Auto Belt	(1)
135	SMQ4826	Cam Gear	(1)
136	SMQT1583	RF Clutch Arm Ass'y	(1)
137	SMQT1584	RF Belt	(1)
138	SMQT1632	RF Slide Lever Ass'y	(1)
139	SMQ4834	Auto Lever	(1)
140	SMQ4938	Auto Lever Collar	(1)
141	SMQ4836	Button Base (L)	(1)
142	SMQ4840	Button Base (R)	(1)
143	SMQT1585	REC. Stopper	(1)
144	SMQT1586	REC. Button Lever	(1)
145	SMQ4846	Play Button Lever	(1)
146	SMQ4848	RWD Button Lever	(1)
147	SMQ4850	FF Button Lever	(1)
148	SMQ4852	Stop Button Lever	(1)
149	SMQ4854	Pause Button Lever	(1)
150	SMQ4856	Button Lever Spring	(3)
151	SMQ4858	Button Lever Spring	(1)
152	SMQ4860	Pause Lever Spring	(1)
153	SMQ2444	Pause Lever	(1)
154	SMQ4862	Stopper	(1)
156	SMQT1587	Push Button Function Lever	(1)
157	SMQT1589	Switch Function Lever	(1)
158	SMQ4872	E Kick Lever	(1)
161	SMQ4880	REC Function Lever Ass'y	(1)
162	SMQT1590	Sub Chassis Ass'y	(1)
166	SMQ4888	Main Gear Spring	(1)
167	SMQ4890	M. Trigger Arm Spring	(1)
168	SMQ4892	M. Trigger Arm Ass'y	(1)
169	SMQ4894	Main Gear	(1)
170	SMQ4896	P Gear	(1)
171	SMQT1591	Main Belt	(1)
172	SMQT1592	Flywheel Ass'y	(1)
173	SMQ4902	P. Trigger Arm Ass'y	(1)
174	SMQ4904	P. Trigger Arm Spring	(1)
175	SMQ4906	Pause Arm Ass'y	(1)
176	SMQ4909	Pause Arm Spring	(1)
177	SMQ4910	Lift Arm Collar	(1)
178	SMQT1593	Lift Arm Ass'y	(1)
179	SMQT1594	Motor Ass'y	(1)
180	SMQT1633	FM Hold Plate	(1)
181	SMQ4916	Motor Rubber	(3)
182	SMQT1595	Flywheel Patch Plate	(1)
183	SMQ4922	Damper Spring	(1)
184	SMQ4940	Kick Lever	(1)
185	SMQ4858	Button Lever Spring	(2)
187	SMQT1453	Pinch Roller Spring	(1)
189	RFS378Z	RF Slide Lever Spring	(1)
190	RFS249Z	Spring	(1)
191	SMQT1631	RF Clutch Arm Spring	(1)
192	RFS253Z	Spring	(1)
193	SMQT1588	Spring	(1)
194	RFS248Z	Spring	(1)
SCREWS and NUTS			
N51	SMQT1581	Collar Screw	(1)
N52	SMQ4838	Collar Screw	(1)
N54	SMQ4870	Collar Screw	(1)
N55	SMQ4878	Collar Screw	(1)
N56	SMQ4918	Collar Screw	(3)
N57	SMQ4942	Collar Screw	(3)
N58	SMQT1454	Polyslider Washer	(1)
N59	XSN2+8	Screw ⊕2×8	(2)
N60	SMQT1634	Screw ⊕2×7	(2)
N61	XWG2	Washer 2φ	(1)
N63	SMQT1582	Collar Screw	(1)
N64	XYN2+C4	Screw ⊕2×4	(2)
N66	XYN2+C5	Screw ⊕2×5	(1)
N67	XYN2+C5	Screw ⊕2×5	(1)
N68	XSN2+6	Screw ⊕2×6	(1)
N70	RFE133Z	E-Ring 1.5φ Special	(2)
N71	SMQ4930	Polyslider Washer	(3)
N72	XUC12FT	E-Ring 1.2φ	(1)
N74	XUC2FT	E-Ring 2.0φ	(2)
N75	XYN26+C6	Screw ⊕2.6×6	(1)
N76	XUC15FT	E-Ring 1.5φ	(1)
N77	SMQ4932	Polyslider Washer	(1)
N78	SMQ4934	Screw ⊕2×3	(3)
N79	XTN26+3	Screw ⊕2.6×3	(1)
N81	SMQ4936	Nylon Washer 2×5×0.5	(1)
N82	SMQ1582	Collar Screw	(3)
N84	SMQ4944	Collar Screw	(1)
N87	XYN2+C5	Screw ⊕2×5	(2)
N88	SMQ4168	Collar Screw	(1)

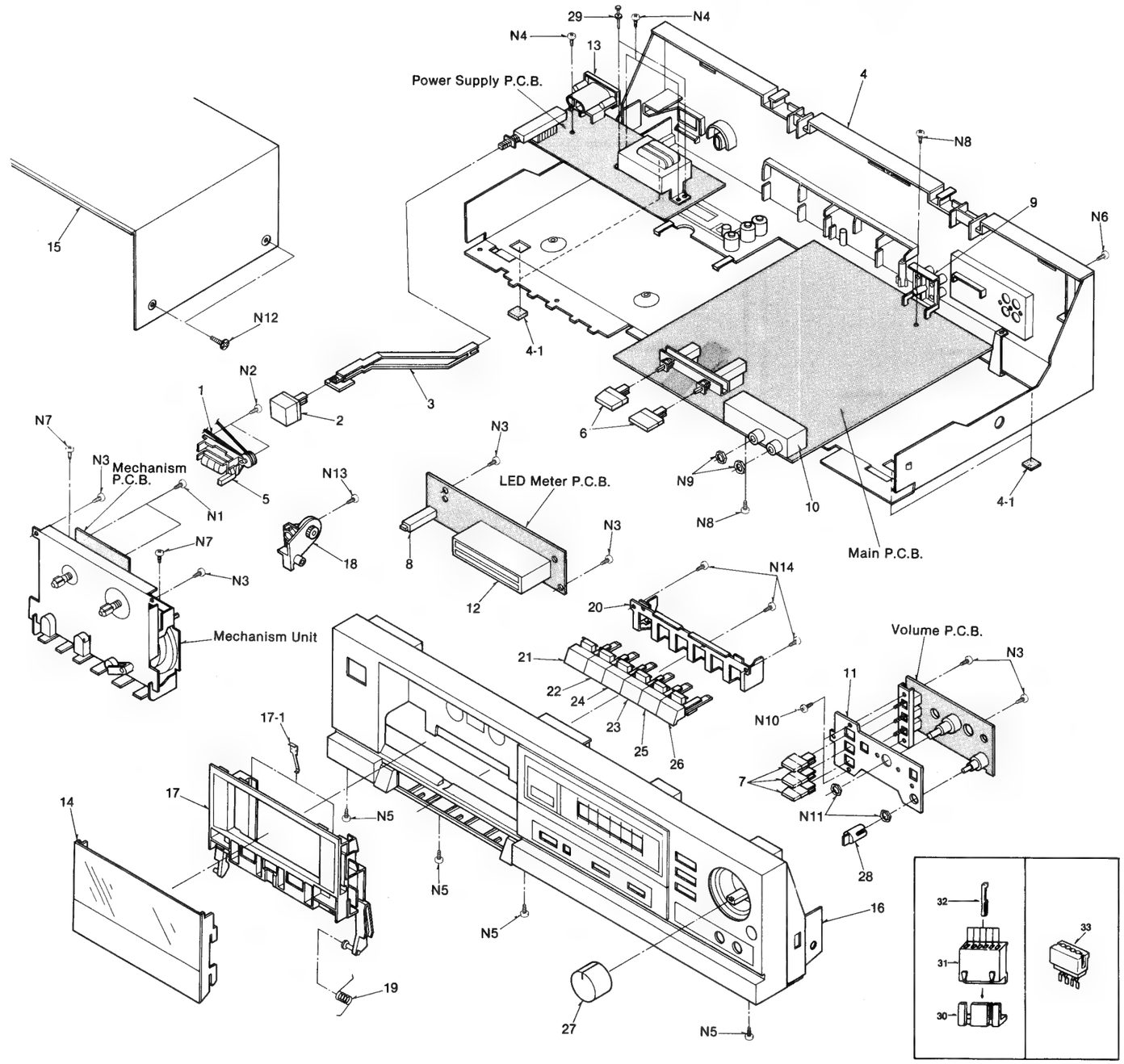
■ CABINET PARTS LOCATIO





tion	Ref. No.	Part No.	Part Name & Description	
(1)	N60	SMQT1634	Screw ⊕2×7	(2)
(1)	N61	XWG2	Washer 2φ	(1)
(2)	N63	SMQT1582	Collar Screw	(1)
(1)	N64	XYN2+C4	Screw ⊕2×4	(2)
	N66	XYN2+C5	Screw ⊕2×5	(1)
ng (1)	N67	XYN2+C5	Screw ⊕2×5	(1)
(1)	N68	XSN2+6	Screw ⊕2×6	(1)
(1)	N70	RFE133Z	E-Ring 1.5φ Special	(2)
	N71	SMQ4930	Polyslider Washer	(3)
(1)	N72	XUC12FT	E-Ring 1.2φ	(1)
(1)	N74	XUC2FT	E-Ring 2.0φ	(2)
(1)	N75	XYN26+C6	Screw ⊕2.6×6	(1)
	N76	XUC15FT	E-Ring 1.5φ	(1)
	N77	SMQ4932	Polyslider Washer	(1)
(1)	N78	SMQ4934	Screw ⊕2×3	(3)
(1)	N79	XTN26+3	Screw ⊕2.6×3	(1)
(1)	N81	SMQ4936	Nylon Washer 2×5×0.5	(1)
(3)	N82	SMQ1582	Collar Screw	(3)
(3)	N84	SMQ4944	Collar Screw	(1)
(1)	N87	XYN2+C5	Screw ⊕2×5	(2)
(2)	N88	SMQ4168	Collar Screw	(1)

■ CABINET PARTS LOCATION



Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.
3. Ⓚ-marked parts are used for black only, while ○-marked parts are for silver type only.
4. Part other then Ⓚ- and ○-marked are use for both black and silver type.
5. The parenthesized numbers in the column of description stand for the quantity per set.

Area

* [M].....U.S.A.	* [E].....All European areas except United Kingdom.
* [EK].....United Kingdom.	* [EGA] ...F.R. Germany.

Ref. No.		Part No.	Part Name & Description	
CABINET and CHASSIS PARTS				
1		SMQ20013	Counter Belt	(1)
2	Ⓚ	SBC666−3	Power Button	(1)
2	○	SBC666	Power Button	(1)
3		SUB255	Connection Rod	(1)
4 [E]		SYK1579−1	Main Case Ass'y	(1)
4 [EK]		SKMSB105−KK	Main Case Ass'y	(1)
4 [EGA]		SKMSB105−KG	Main Case Ass'y	(1)
4 [M]		SKMSB105−KM	Main Case Ass'y	(1)
[4-1		[SKL293	Foot	(4)
5		SJN19	Tape Counter	(1)
6	Ⓚ	SBC723−1	Button	(2)
6	○	SBC723−4	Button	(2)
7	Ⓚ	SBC799	Button	(3)
7	○	SBC799−1	Button	(3)
8		LN018305PH	L.E.D Ass'y (D713)	(1)
9		SJF3057N	Terminal Board	(1)
10		QMA4779	Bracket (Mic)	(1)
11		SMN2000	Bracket (Volume)	(1)
12		SWV0083	L.E.D Ass'y (D701∼712)	(1)
13	⚠	SJS9236	AC Inlet	(1)
14	Ⓚ	SGE1781	Cassette Lid	(1)
14	○	SGE1871−1	Cassette Lid	(1)
15	Ⓚ	SKC1920K99	Cabinet	(1)
15	○	SKC1920S98	Cabinet	(1)
16 [E, EK]	Ⓚ	SGYSB105−KE	Front Panel Ass'y	(1)
16 [EGA]	Ⓚ	SGYSB105−KG	Front Panel Ass'y	(1)
16 [E, EK]	○	SGYSB105−SE	Front Panel Ass'y	(1)
16 [EGA]	○	SGYSB105−SG	Front Panel Ass'y	(1)
16 [M]	Ⓚ	SGYSB105−KM	Front Panel Ass'y	(1)
16 [M]	○	SGYSB105−SM	Front Panel Ass'y	(1)
17		SGXSB205−KE	Cassette Holder Ass'y	(1)
[17-1		[QBP2006A	Tape Pressure Spring	(2)
18		SGXSB205−KE1	Damper Gear Ass'y	(1)
19		SUS797−1	Holder Spring	(1)
20		SMN2001−1	Bracket	(1)
21	Ⓚ	SBC801A	Button, REC	(1)
21	○	SBC801A−1	Button, REC	(1)
22	Ⓚ	SBC802A	Button, PLAY	(1)
22	○	SBC802A−1	Button, PLAY	(1)
23	Ⓚ	SBC803A	Button, FF	(1)
23	○	SBC803A−1	Button, FF	(1)
24	Ⓚ	SBC804A	Button, REW	(1)
24	○	SBC804A−1	Button, REW	(1)
25	Ⓚ	SBC805A	Button, STOP	(1)
25	○	SBC805A−1	Button, STOP	(1)
26	Ⓚ	SBC806A	Button, PAUSE	(1)
26	○	SBC806A−1	Button, PAUSE	(1)
27	Ⓚ	SBN1204	Knob, Input Level	(1)
27	○	SBN1204−1	Knob, Input Level	(1)
28	Ⓚ	SBN1205	Knob, Balance	(1)
28	○	SBN1205−1	Knob, Balance	(1)
29		SSUM101N08	Nylon Rivet	(2)
30		QJP1920TN	2P Plug	
30		QJP1921TN	3P Plug	
31		QJS1920TN	2P Socket	(1)
31		QJS1921TN	3P Socket	(1)
32		QJT1054	Contact	(5)
33		SJT30543−V	5P Terminal	(1)
33		SJT30643−V	6P Terminal	(1)
SCREWS and NUTS				
N1		XTV3+8F	Tapping, ⊕3×8	(2)
N2		XTV26+8J	Tapping, ⊕2.6×8	(2)
N3		XTV3+10JFR	Tapping, ⊕3×10	(6)
N4		XTW3+12QFR	Tapping, ⊕3×12	(3)
N5		XTB3+8J	Tapping, ⊕3×8	(4)
N6		XTB3+12JFZ	Tapping, ⊕3×12	(1)
N7		XTB3+6FFR	Tapping, ⊕3×6	(2)
N8		XTBS3+8JFZ1	Tapping, ⊕3×8	(2)
N9		QNQ1070	Nut	(3)
N10		XTN3+6FFR	Tapping, ⊕3×6	(2)
N11		XNS8B	Nut, φ8	(2)
N12	Ⓚ	SNE2125−1	Cabinet	(4)
N12	○	SNE2125	Cabinet	(4)
N13		XTV3+12J	Tapping, ⊕3×12	(1)
N14		XTV26+8J	Tapping, ⊕2.6×8	(3)
ACCESSORIES				
A1 [E]		SQF12658	Instruction Book	(1)
A1 [EK]		SQF12659	Instruction Book	(1)
A1 [EGA]		SQF12660	Instruction Book	(1)
A1 [M]		SQF12661	Instruction Book	(1)
A2 [EK] ⚠		SFDAC05G02	AC Cord	(1)
A2 [E, EGA]	⚠	SJA171	AC Cord	(1)
A2 [M]	⚠	SJA170	AC Cord	(1)
A3		SJP2264	Cord	(1)
PACKING PARTS				
P1 [E, EGA]	Ⓚ	SPG5574	Carton Box	(1)
P1 [EK]	Ⓚ	SPG5576	Carton Box	(1)
P1 [E, EGA]	○	SPG5575	Carton Box	(1)
P1 [EK]	○	SPG5577	Carton Box	(1)
P1 [M]	Ⓚ	SPG5578	Carton Box	(1)
P2		SPS4705	Pad, Left Side	(1)
P3		SPS4706	Pad, Right Side	(1)
P4		SPS4723	Pad	(1)
P5		XZB50X65A02	Polyethylene Bag	(1)

Printed in Japan
860209200 Ⓜ AH/TN/MS

ORDER NO. HAD8602336C0-A

Dolby NR-Equipped Stereo Cassette Deck

RS-B105

DEUTSCH

- This booklet includes the specifications and adjusting procedures of Model RS-B105 (Order No. HAD8602336C0) written in German, French and Spanish.
- File this booklet together with the service manual of Model RS-B105.

- Dieses Büchlein umfaßt die technischen Daten und Justierverfahren für Modell RS-B105 (Bestell-Nr. HAD8602336C0) in den Sprachen Deutsch, Französisch und Spanisch.
- Bewahren Sie dieses Büchlein zusammen mit dem Service-Handbuch für Modell RS-B105 auf.

- Cette brochure comprend les spécifications et les procédures de mises du Modèle RS-B105 (N° d'order HAD8602336C0) écrites en allemand, en français et en espagnol.
- Classer cette brochure en même temps qu'avec le manuel de service du Modèle RS-B105.

- Este librito incluye las especificaciones y procedimientos de Modelo RS-B105 (Pedido N° HAD8602336C0) escritas en alemán, francés y español.
- Guardar este librito juntamente con el manual de servico de Modelo RS-B105.

DEUTSCH

■ TECHNISCHE DATEN

System	Stereo-Cassettendeck
Spuren	4 Spuren, 2 Kanäle
Tonköpfe	
Aufnahme/Wiedergabe	MX-Kopf
Löschen	Ferrit-Kopf mit Doppelspalt
Motor	1-Motor
Aufnahmesystem	Wechselstrom-Vormagnetisierung
Vormagnetisierungsfrequenz	50kHz
Löschsystem	Wechselstrom-Vormagnetisierung
Bandgeschwindigkeit	4,8cm/s
Frequenzgang	
Reineisenbänder	20Hz~16.000Hz
	30Hz~15.000Hz (DIN)
	40Hz~15.000Hz±3dB
CrO_2-Bänder	20Hz~15.000Hz
	30Hz~15.000Hz (DIN)
	40Hz~14.000Hz±3dB
Normalbänder	20Hz~15.000Hz
	30Hz~15.000Hz (DIN)
	40Hz~14.000Hz±3dB

Geräuschspannungsabstand:	
(Signalpegel=max. Aussteuerungspegel, CrO_2-Band)	
mit Dolby-B-Rauschunterdrückung	66dB (CCIR)
ohne Rauschunterdrückung	56dB (nach A bewertet)
Gleichlaufschwankungen	0,08% (WRMS)
	±0,2% (DIN)
Umspulzeit	ca. 105 s für C-60-Cassette
Eingangsempfindlichkeit und Impedanz	
MIC	0,25mV/400Ω~10kΩ
LINE	60mV/47kΩ
DIN	0,25mV/3,3kΩ
Ausgangsspannung und Impedanz	
LINE	400mV/3,2kΩ
Stromaufnahme	9W
Stromversorgung	
Netz 50Hz/60Hz, 220V für Europa ohne England.	
Abmessungen (B×H×T)	430×115×220mm
Gewicht	3,0kg

■ MESSUNGEN UND EINSTELL METHODEN

Meßbedingungen

- Eingangspegelregler; Maximum
- Balanceregler; Mitte
- Bandsorten-Wahlschalter; Normal
- Dolby-Rauschunter drückungs-Schalter; out
- Überprüfen, ob die Köpfe sauber sind.
- Überprüfen, ob die Bandantriebsachse und die Andruckrolle sauber sind.
- Umgebungstemperatur für die Messung; 20±5°C (68±9°F)

Meßinstrumente

- Elektronisches Voltmeter (EVM)
- Oszilloskop
- Digitaler Frequenzmesser
- Audiofrequenz-Oszillator
- Dämpfungswiderstand
- Gleichstrom-Voltmeter
- Widerstand (600Ω)

Testband

- Kopfazimut-Justierung (8kHz, −20dB); QZZCFM
- Justierung der Bandgeschwindigkeit (3kHz, −10dB); QZZCWAT
- Wiedergabe-Frequenzgang (315Hz, 12,5kHz, 10kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125kHz, 63Hz, −20dB); QZZCFM
- Justierung des Wiedergabe-Verstärkungsgrades (315Hz, 0dB); QZZCFM
- Gesamtfrequenzgang, Gesamtverstärkungsgrad-Justierung
  - Normales Referenz-Leerband; QZZCRA
  - CrO_2-Referenz-Leerband; QZZCRX
  - Reineisen-Referenz-Leerband; QZZCRZ

Kopfazimut-Justierung

1. Die Anschlußverbindungen für die Testgeräte sind in Abb. 1 gezeigt.
2. Den Azimut-Justierungsteil (8kHz, −20dB) des Testbandes (QZZCFM) wiedergeben und die Winkeljustierungs-Einstellschraube so verstellen, daß der Ausgang vom linken und rechten Kanal maximal wird. (Wenn die Justierpositionen für den linken und rechten Kanal verschieden sind, ist eine Position zu finden, wo der Ausgang des linken und rechten Kanals ausgelichen ist, und dann ist die Justierung durchzuführen.)
3. Gleichzeitig eine Lissajous-Wellenform ziehen und Phasenablenkung eliminieren.
4. Nach erfolgter Justierung sind die Bandführungs-Höhen-und-Winkeljustierschrauben zu sichern.

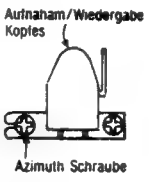


Abb. 2

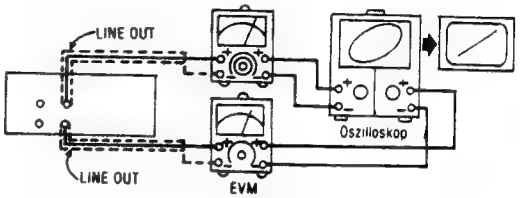


Abb. 1

Bandgeschwindigkeits-Justierung

1. Der Testaufbau ist in Abb. 3 gezeigt.
2. Den mittleren Teil des Testbandes (QZZCWAT) wiedergeben.
3. Den Drehwiderstand im Motor so justieren. daß die Ausgangsleistung dem Standard-Wert entspricht.

Standard-Wert: 3000±20Hz

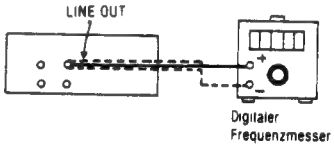


Abb. 3

Wiedergabe-Frequenzgang

1. Der Testaufbau ist in Abb. 4 gezeigt.
2. Den Wiedergabe-Frequenzgangteil (315Hz, 12,5kHz~63Hz, −20dB) des Testbandes (QZZCFM) wiedergeben.
3. Überprüfen, ob der Frequenzgang innerhalb des in Abb. 5 für den linken und rechten Kanal gezeigten Bereichs liegt.

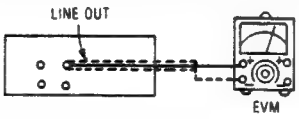


Abb. 4

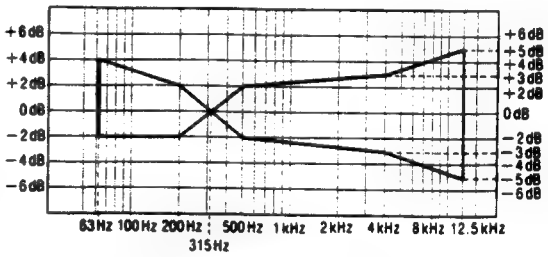


Abb. 5

Justierung des Wiedergabe-Verstärkungsgrades

1. Der Testaufbau ist in Abb. 4 gezeigt.
2. Den für den Wiedergabe-Verstärkungsgrad justierten Teil (315Hz, 0dB) des Testbandes (QZZCFM) wiedergeben.
3. Den Drehwiderstand 1, (linker Kanal) {Drehwiderstand 2 (rechter Kanal)} so justieren, daß die Ausgangsleistung dem Standard-Wert entspricht.

Standard-Wert: 0,4V±0,5dB (0,02V)

Justierung des Vormagnetisierungsstroms

1. Der Testaufbau ist in Abb. 6 gezeigt.
2. Den Bandsorten-Wahlschalter in die "Normal"-position einstellen.
3. Eine Normalband-Cassette einsetzen.
4. Die Aufnahmetaste und die Pausentaste drücken.
5. Den Eingangspegelregler auf Minimum einstellen und den Drehwiderstand 301 (linker Kanal) {Drehwiderstand 302 (rechter Kanal)} so einstellen, daß die Ausgangsleistung zwischen Testpunkt 1 (linker Kanal) {Testpunkt 2 (rechter Kanal)} und Masse dem Standard-Wert entspricht.
6. Anschließend für CrO_2-und Reineisenband auf gleiche Weise prüfen.

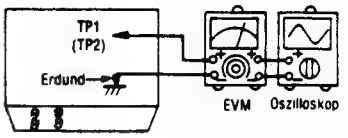


Abb. 6

Referenzwert:	9V (Normal) 14V (CrO_2) 17V (Metal)

Gesamtfrequenzgang

1. Der Testaufbau ist in Abb. 7 gezeigt.
2. Den Bandsorten-Wahlschalter in die "Normal"-Position einstellen.
3. Eine Normalband-Leercassette (QZZCRA) einsetzen und aufnehmen, während ein Signal von nacheinander 50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz und 10kHz bei 20dB, abgeschwächt vom Referenz-Eingangspegelsignal (1kHz, −24dB) eingegeben wird.

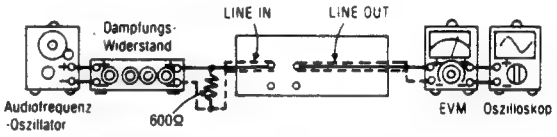


Abb. 7

4. Das in Schritt 2 aufgezeichnete Signal wiedergeben und prüfen, ob der Pegel jeder Ausgangsfrequenz im Bereich liegt, der in Abb. 8 im Vergleich zur Referenzfrequenz (1kHz) gezeigt wird.
5. Falls er nicht im Standard-Bereich liegt, ist der Vormagnetisierungs-strom mit Drehwiderstand 301 (linker Kanal) {Drehwiderstand 302 (rechter Kanal)} so zu justieren, daß der Frequenzpegel innerhalb des Standards zu liegen kommt.
   - Erhöhter Pegel im Frequenzbereich..... Den Vormagnetisierungsstrom erhöhen.
   - Reduzierter Pegel im Frequenzbereich..... Den Vormagnetisierungsstrom senken.
6. Anschließend das auf der CrO_2-Leerband-Cassette (QZZCRX) und der Reineisenband-Leercassette (QZZCRZ) aufgezeichnete Signal auf 12,5kHz erhöhen und auf gleiche Weise justieren, wie vorgehend beschrieben. Dann überprüfen, ob der Frequenzpegel innerhalb des in Abb. 9 gezeigten Bereichs liegt.

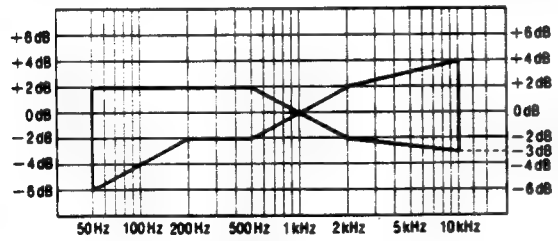


Abb. 8

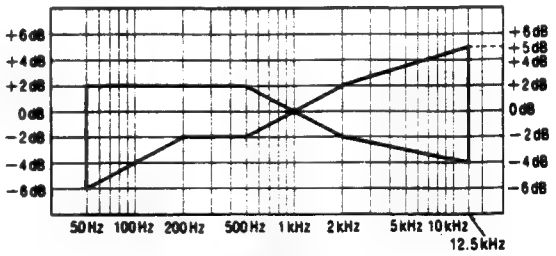


Abb. 9

Justierung des Gesamtverstärkungsgrades

1. Der Testaufbau ist in Abb. 7 gezeigt.
2. Den Bandsorten-Wahlschalter in die "Normal"-Position einstellen.
3. Eine Normalband-Leercassette (QZZCRA) einsetzen und im Aufnahmepause-Zustand des Gerätes das Referenzsignal (1kHz, −24dB) eingeben.
4. Die Ausgangsleistung mit dem Dämpfungswiderstand auf 0,42V justieren und dann aufnehmen.
5. Das in Schritt 3 aufgezeichnete Signal wiedergeben und überprüfen, ob die Ausgangsleistung dem Standard-Wert entspricht.
6. Falls sie nicht dem Standard-Wert entspricht, ist der Drehwiderstand 3 (linker Kanal) {Drehwiderstand 4 (rechter Kanal)} zu justieren, und dann sind die Schritte (2), (3) und (4) zu wiederholen, bis die Ausgangsleistung dem Standard-Wert entspricht.

Standard-Wert; 0,4V±0,05V

Dolby-Rauschunterdrückungs-Schaltkreis

1. Der Testaufbau ist in Abb 10 gezeigt.
2. Eine Normalband-Cassette einsetzen und im Aufnahmepause-Zustand des Gerätes ein 5kHz-Signal eingeben.
3. Mit dem Dämpfurgswiderstand so justieren, daß die Ausgangsleistung zwischen Anschluß ⑥ (linker Kanal) (Anschluß ⑲ (rechter Kanal)) des IC401 und Masse 12.3mV beträgt.
4. Den Rauschunterdrückungs-Schalter (NR) einschalten und prüfen, ob der Pegel wie vorgeschrieben gegenüber dem Pegel im rauschunterdrückungsfreien Zustand verändert wird.

Standard-Wert: 8±1,5dB

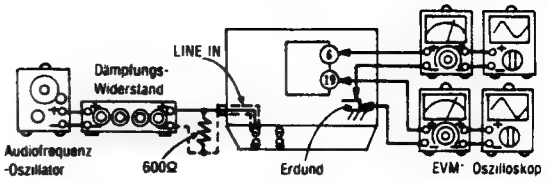


Abb. 10

FRANÇAIS

■ CARACTERISTIQUES

Platine	Platine magnéto-cassette stéréo
Pistes	4 pistes, 2 canaux
Têtes	
ENREGISTREMENT/LECTURE	Tête en MX
Effacement	Tête en ferrite à double entrefer
Moteur	1-moteur
Système d'enregistrement	Polarisation CA
Fréquence de polarisation	50kHz
Système d'effacement	Polarisation CA
Vitesse de défilement de la bande	4,8cm/sec.
Réponse en fréquence	
Métal	20Hz~16.000Hz
	30Hz~15.000Hz (DIN)
	40Hz~15.000Hz±3dB
CrO_2	20Hz~15.000Hz
	30Hz~15.000Hz (DIN)
	40Hz~14.000Hz±3dB
Normal	20Hz~15.000Hz
	30Hz~15.000Hz (DIN)
	40Hz~14.000Hz±3dB

Rapport signal/bruit:	
(niveau de signal=niveau d'enregistrement maximum, bande magnétique de type CrO_2)	
Système de Dolby B	66dB (CCIR)
Pas de système de NR	56dB (A pondéré)
Pleurage et scintillement	0,08% (WRMS)
	±0,2% (DIN)
Temps d'avance rapide et de rebobinage	Environ 105 secondes pour une cassette C-60
Sensibilité et impédance d'entrée	
MIC	0,25mV/400Ω~10kΩ
LIGNE	60mV/47kΩ
Tension et impédance de sortie	
LIGNE	400mV/3,2kΩ
Consommation	9W
Alimentation	AC 50Hz/60Hz 220V pour l'Europe sauf la Grande Bretagne
Dimensions (L×H×P)	430×115×220mm
Poids	3,0kg

■ METHODES DES MEASURES ET REGLAGES

Conditions pour le mesurage

- Commandes du niveau d'entrée; Maximum
- Régulateurs de balance; Centre
- Commutateur sélecteur de bande; Normal
- Commutateur de réduction des bruits Dolby; Hors circuit
- S'assurer que les têtes soient propres.
- S'assurer que le cabestan et les galets-presseurs scient propres.
- Température de la pièce jugée: 20±5°C (68±9°F)

Appareils de mesurage

- Voltmètre électronique
- Oscilloscope
- Compteur de fréquence numérique
- Oscillateur de fréquence audio
- A.T.T. (Atténuateur)
- Voltmètre à C.C.
- Résistance (600Ω)

Bande d'essai

- Réglage de l'angle des têtes de lecture (8kHz, −20dB); QZZCFM
- Réglage de la vitesse de défilement de la bande (3kHz, −10dB); QZZCWAT
- Réponse en fréquence de la lecture (315Hz, 12,5kHz, 10kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz, 63Hz, −20dB); QZZCFM
- Réglage d'amplification de la lecture (315Hz, 0dB); QZZCFM
- Réponse en fréquence globale, réglage d'amplification globale
  - Bande vierge de référence normale; QZZCRA
  - Bande vierge de référence CrO_2; QZZCRX
  - Bande vierge de référence métallisée; QZZCRZ

Réglage de l'angle des têtes de lecture

1. Le raccordement de l'équipement d'essai est montré à la Fig. 1.
2. Faire jouer la partie réglée azimutale (8kHz, −20dB) de la bande d'essai (QZZCFM) et. régler la vis de mise au point azimutale de telle sorte que les puissances de sortie du canal de gauche et du canal de droite soient au maximum.
   (Si les positions de réglage du canal de gauche et du canal de droite sont différentes, trouver une position où les puissances de sortie des canaux de gauche et de droite soient équilibrées, puis effectuer la mise au point.)
3. En même temps, établir une forme d'onde de Lissajous et éliminer la déviation de phase.
4. Après le réglage, bloquer les vis du réglage angulaire et de la hauteur des guides de bande.

Fig. 2

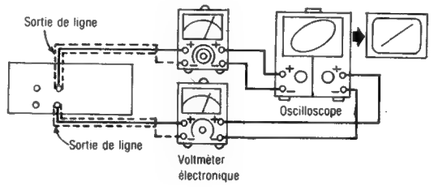


Fig. 1

Réglage de la vitesse de défilement de la bande

1. Le raccordement de l'equipement d'essai est montré à la Fig. 3.
2. Faire jouer la partie centrale de la bande d'essai (QZZCWAT).
3. Régler VR dans le moteur de telle sorte que la puissance de sortie soit en deçà de la normale.

Valeur normalisée: 3000±20Hz

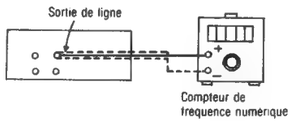


Fig. 3

Réponse en fréquence de la lecture

1. Le raccordement de l'équipment d'essai est montré à la Fig. 4.
2. Faire jouer la partie de la réponse en fréquence de la lecture (315Hz, 12,5kHz~63Hz, −20dB) de la bande d'essai (QZZCFM).
3. Vérifier que la fréquence soit en deçà de la plage montrée à la Fig. 5, à la fois pour le canal de gauche et le canal de droite.

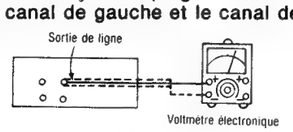


Fig. 4

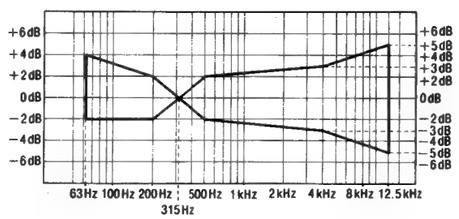


Fig. 5

Réglage d'amplification de la lecture

1. Le raccordement de l'équipement d'essai est montré à la Fig. 4.
2. Faire jouer la partie réglée d'amplification de la lecture (315Hz, 0dB) de la bande d'essai (QZZCFM).
3. Régler VR 1 (canal de gauche) [VR 2 (canal de droite)] de telle sorte que la puissance de sortie soit en deçà de la normale.

Valeur normalisée: 0,4±0,5dB (0,02V)

Réglage du courant de polarisation

1. Le raccordement de l'équipement d'essai est montré à la Fig. 6.
2. Régler le commutateur sélecteur de bande sur la position normale.
3. Introduire la bande normale.
4. Appuyer sur les touches d'enregistrement et d'intermission.
5. Réduire au minimum la commande du niveau d'entrée et régler VR301 (canal de gauche) [VR302 (canal de droite)], de telle sorte que la puissance de sortie entre TP1 (canal de gauche) [TP2 (canal de droite)] et la masse soit en deçà de la normale.
6. Après cela, vérifier de la même manière pour la bande CrO_2 et la bande métallisée.

Valeur de référence: 9V (Normal)
14V (CrO_2)
17V (Metal)

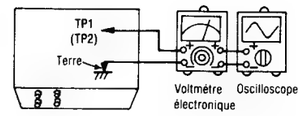


Fig. 6

Réponse en fréquence globale

1. Le raccordement de l'équipement d'essai est montré à la Fig. 7.
2. Régler le commutateur sélecteur de bande sur la position normale.
3. Installer une bande vierge normale (QZZCRA) et enregistrer en appliquant un signal (50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz et 10kHz) de 20dB atténués provenant du signal du niveau d'entrée, de référence (1kHz, −24dB).
4. Faire jouer le signal enregistré à l'étape 2 et vérifier que le niveau de chaque fréquence de sortie soit en deçà de la plage montrée la Fig. 8 en comparaison avec la fréquence de référence (1kHz).
5. S'il n'est pas en deçà de la plage standard, régler le courant de polarisation avec VR301 (canal de gauche) [VR302 (canal de droite)], de telle sorte que le niveau de fréquence soit en deçà de la normale.
   - Niveau vers la haut dans la plage de fréquence élevée..... Augmenter le courant de polarisation.
   - Niveau vers le bas dans la plage de fréquence élevée..... Diminuer le courant de polarisation.
6. Après cela, amplifier le signal enregistré sur la bande vierge CrO_2 (QZZCRX) et la bande vierge métallisée (QZZCRZ) jusqu'à 12,5kHz et régler de la même manière que celle mentionnée ci-dessus. Puis, vérifier que le niveau de fréquence soit en deçà de la plage montrée à la Fig. 9.

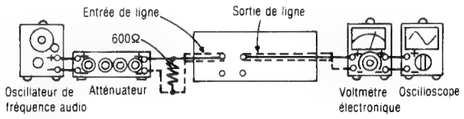


Fig. 7

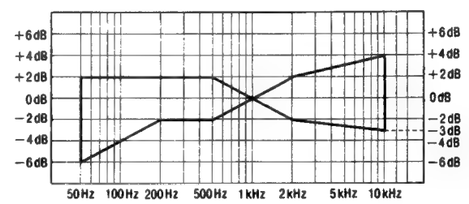


Fig. 8

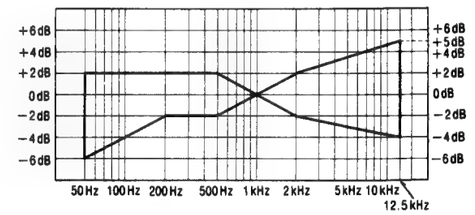


Fig. 9

Réglage d'amplification globale

1. Le raccordement de l'équipement d'essai est montré à la Fig. 7.
2. Régler le commutateur sélecteur de bande sur la position normale.
3. Installer une bande vierge normale (QZZCRA) et appliquer le signal de niveau d'entrée de référence (1kHz, −24dB) sur le mode d'intermission d'enregistrement.
4. Régler la puissance de sortie 0,42V avec l'atténuateur, puis enregistrer.
5. Faire jouer le signal enregistré à l'étape 3 et vérifier que la puissance de sortie soit en deçà de la normale.
6. Si elle n'est pas en deçà de la normale, régler VR3 (canal de gauche) [VR4 (canal de droite)] et répéter les étapes (2), (3) et (4) jusqu'à ce que la puissance de sortie soit en deçà de la normale.

Valeur normalisee: 0,4±0,05V

FRANÇAIS

Circuit de réduction des bruits Dolby

1. Le raccordement de l'équipement d'essai est montré à la Fig. 10.
2. Installer une bande normale et appliquer un signal de 5kHz sur le mode d'intermission d'enregistrement.
3. Régler avec l'atténuateur de telle sorte que la puissance de sortie entre la borne ⑥ (canal de gauche) [borne ⑲ (canal de droite)] de IC401 et la masse soit de 12,3mV.
4. Mettre en marche le commutateur de réduction des bruits et vérifier que le niveau change tel qu'il est spécifié à partir du niveau d'entrée sur le mode de sortie de réduction des bruits.

Valeur normalisée: 8±1,5dB

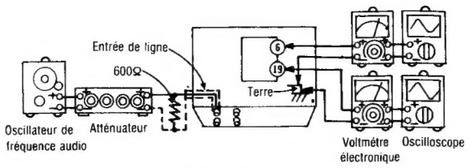


Fig. 10

ESPAÑOL

ESPAÑOL

■ ESPECIFICACIONES TECNICAS

Sistema de platina	Platina de cassette estéreo
Sistema de pistas	4 pistas, 2 canales
Cabezas de GRAB/REPROD	Cabeza de MX
Cabezas de borrado	Cabeza de ferrita de 2 entrehierros
Motores	1 motor
Frecuencia de polarización	50kHz
Sistema de borrado	Polarización de CA
Velocidad de cinta	4,8cm/seg.
Respuesta de frecuencia	
Metal	20Hz~16,000Hz
	30Hz~15.000Hz (DIN)
	40Hz~15.000Hz±3dB
CrO_2	20Hz~15.000Hz
	30Hz~15.000Hz (DIN)
	40Hz~14.000Hz±3dB
Normal	20Hz~15,000Hz
	30Hz~15,000Hz (DIN)
	40Hz~14,000Hz±3dB
Señal a ruido:	
(niveau de señal=niveal de grabación máx. tipo de cinta CrO_2)	
con reducción de ruidos Dolby B	66dB (CCIR)
sin reducción de ruidos	56dB (promedio A)
Variación de velocidad	0,08% (WRMS) ±0,2% (DIN)
Tiempo de avance rápido y rebobinado	Approx. 105 segundos con cintas C-60
Sensibilidad de entrada e impedancia	
MIC	0,25mV/400Ω~10kΩ
LINE	60mV/47kΩ
Voltaje de salida e impedancia	
LINE	400mV/3,2kΩ
Consumo de corriente	9W
Alimentación de energía	220V para Europe realizar Royaume-Uni.
Dimensions (An.×Al×Prof.)	430×115×220mm
Peso	3,0kg

■ METODOS DE AJUSTE Y MEDIDA

Condición de medición

- Controles de nivel de entrada; Máximo
- Controles de equilibrio; Centro
- Interruptor selector de cinta; Normal
- Interruptor RR Dolby; Fuera (out)
- Asegurarse de que las cabezas están limpias
- Asegurarse de que el cabrestante y rodillo de presión están limpios
- Temperatura ambiente previsible 20±5°C (68±9°F)

Instrumento de medición

- EVM (Voltimetro electrónico)
- Osciloscopio
- Frecuencimetro digital
- Oscilador AF
- ATT (Atenuador)
- Voltimetro CC
- Resistor (600Ω)

Cinta de prueba

- Ajuste acimutal de cabeza (8kHz, −20dB); QZZCFM
- Ajuste de velocidad de cinta (3kHz, −10dB); QZZCWAT
- Respuesta de frecuencia de reproducción (315Hz, 12,5kHz, 10kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz, 63Hz, −20dB); QZZCFM
- Ajuste de ganancia de reproducción (315Hz, 0dB); QZZCFM
- Respuesta de frecuencia total, Ajuste de ganancia total
  - Cinta virgen de referencia normal; QZZCRA
  - Cinta virgen de referencia CrO_2; QZZCRX
  - Cinta virgen de referencia metálica; QZZCRZ

Ajuste acimutal de cabeza

1. La conexión del equipo de prueba se muestra en la Fig. 1.
2. Reproducir la parte ajustada de acimut (8kHz, −20dB) de la cinta de prueba (QZZCFM) y regular el tornillo de ajuste de ángulo de manera que las salidas de CH-I y CH-D sean maximizadas.
   (Cuando las posiciones de ajuste sean diferentes de CH-I y CH-D, encontrar una posición donde las salidas de CH-I y CH-D estén equilibradas y, luego, hacer el ajuste.)
3. Al mismo tiempo, trazar una forma de onda de Lissajous y eliminar la deflexión de fase.
4. Después del ajuste, fije los tornillos de ajuste de altura y ángulo de guía de cinta.

Fig. 2

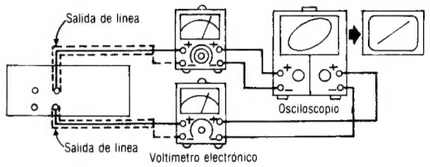


Fig. 1

Ajuste de velocidad de cinta

1. La conexión del equipo de prueba se muestra en la Fig. 3.
2. Reproducir la parte media de la cinta de prueba (QZZCWAT).
3. Ajustar el RV del motor de manera que la salida esté dentro de la estandard.

Valor estandard: 3000±20Hz

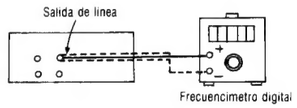


Fig. 3

Respuesta de frecuencia de reproducción

1. La conexión del equipo de prueba se muestra en la Fig. 4.
2. Reproducir la parte de respuesta de frecuencia de reproducción (315Hz, 12,5kHz — 63Hz, −20dB) de la cinta de prueba (QZZCFM).
3. Comprobar que la frecuencia esté dentro de la gama mostrada en la Fig. 5 tanto para CH-I como para CH-D.

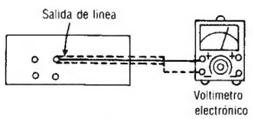


Fig. 4

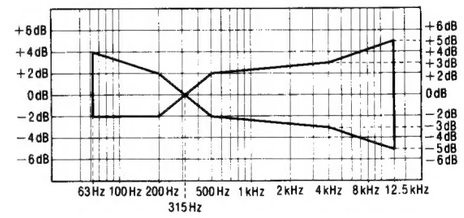


Fig. 5

Ajuste de ganancia de reproducción

1. La conexión del equipo de prueba se muestra en la Fig. 4.
2. Reproducir la parte ajustada de la ganancia de reproducción (315Hz, 0dB) de la cinta de prueba (QZZCFM).
3. Ajustar RV1 (CH-I) {RV2 (CH−D)} de manera que la salida esté dentro de la estandard.

Valor estandard: 0,4±0,5dB (0,02V)

Instrumento de medición

- EVM (Voltimetro electrónico)
- Osciloscopio
- Frecuencimetro digital
- Oscilador AF
- ATT (Atenuador)
- Voltimetro CC
- Resistor (600Ω)

Cinta de prueba

- Ajuste acimutal de cabeza (8kHz, −20dB); QZZCFM
- Ajuste de velocidad de cinta (3kHz, −10dB); QZZCWAT
- Respuesta de frecuencia de reproducción (315Hz, 12,5kHz, 10kHz, 8kHz, 4kHz, 1kHz, 250Hz, 125Hz, 63Hz, −20dB); QZZCFM
- Ajuste de ganancia de reproducción (315Hz, 0dB); QZZCFM
- Respuesta de frecuencia total, Ajuste de ganancia total
  - Cinta virgen de referencia normal; QZZCRA
  - Cinta virgen de referencia CrO_2; QZZCRX
  - Cinta virgen de referencia metálica; QZZCRZ

Ajuste acimutal de cabeza

1. La conexión del equipo de prueba se muestra en la Fig. 1.
2. Reproducir la parte ajustada de acimut (8kHz, −20dB) de la cinta de prueba (QZZCFM) y regular el tornillo de ajuste de ángulo de manera que las salidas de CH-I y CH-D sean maximizadas.
   (Cuando las posiciones de ajuste sean diferentes de CH-I y CH-D, encontrar una posición donde las salidas de CH-I y CH-D estén equilibradas y, luego, hacer el ajuste.)
3. Al mismo tiempo, trazar una forma de onda de Lissajous y eliminar la deflexión de fase.
4. Después del ajuste, fije los tornillos de ajuste de altura y ángulo de guía de cinta.

Fig. 2

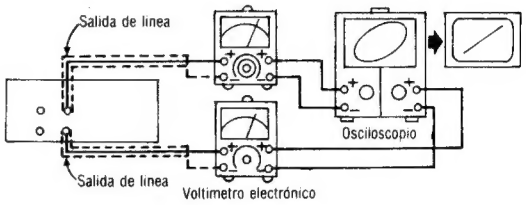


Fig. 1

Ajuste de velocidad de cinta

1. La conexión del equipo de prueba se muestra en la Fig. 3.
2. Reproducir la parte media de la cinta de prueba (QZZCWAT).
3. Ajustar el RV del motor de manera que la salida esté dentro de la estandard.

Valor estandard: 3000±20Hz

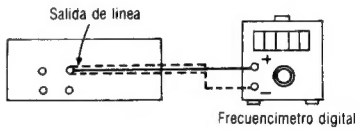


Fig. 3

Respuesta de frecuencia de reproducción

1. La conexión del equipo de prueba se muestra en la Fig. 4.
2. Reproducir la parte de respuesta de frecuencia de reproducción (315Hz, 12,5kHz — 63Hz, −20dB) de la cinta de prueba (QZZCFM).
3. Comprobar que la frecuencia esté dentro de la gama mostrada en la Fig. 5 tanto para CH-I como para CH-D.

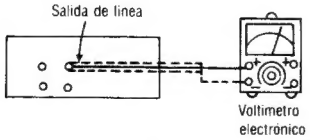


Fig. 4

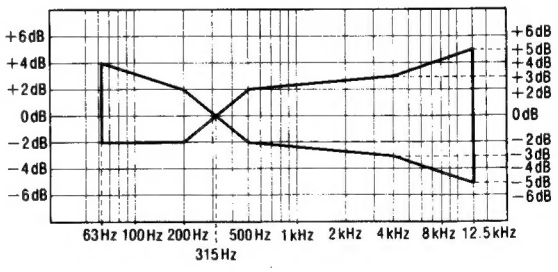


Fig. 5

Ajuste de ganancia de reproducción

1. La conexión del equipo de prueba se muestra en la Fig. 4.
2. Reproducir la parte ajustada de la ganancia de reproducción (315Hz, 0dB) de la cinta de prueba (QZZCFM).
3. Ajustar RV1 (CH-I) {RV2 (CH−D)} de manera que la salida esté dentro de la estandard.

Valor estandard: 0,4±0,5dB (0,02V)

Ajuste de corriente de polarización

1. La conexión del equipo de prueba se muestra en la Fig. 6.
2. Poner el interruptor selector de cinta en la posición "normal".
3. Insertar la cinta metálica.
4. Apretar los botones de grabación y pausa.
5. Minimizar el control de nivel de entrada y ajustar RV301 (CH-I) (RV302 (CH-D)) de manera que la salida entre TP1 (CH-I) (TP2 (CH-D)) y tierra esté dentro de la estandard.
6. Después de eso, comprobar de la misma manera para cinta CrO_2 y metálica.

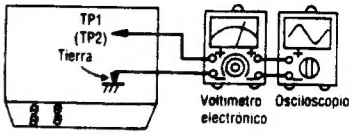


Fig. 6

Valor de referencia:	**9V (Normalcia)** **14V (CrO_2)** **17V (Metal)**

Respuesta de frecuencia total

1. La conexión del equipo de prueba se muestra en la Fig. 7.
2. Poner el interruptor selector de cinta en la posición "normal".
3. Colocar una cinta virgen normal (QZZCRA) y grabar aplicando señal (50Hz, 100Hz, 200Hz, 500Hz, 1kHz, 4kHz, 8kHz y 10kHz), 20dB atenuada de la señal de nivel de entrada de referencia (1kHz, −24dB).

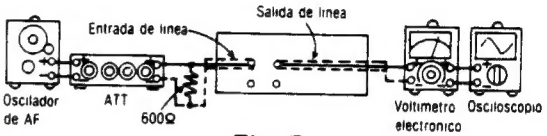


Fig. 7

4. Reproducir la señal grabada en el paso 2 y comprobar que el nivel de cada frecuencia de salida esté dentro de la gama mostrada en la Fig. 8. en comparación con la frecuencia de referencia (1kHz).
5. Si no está dentro de la gama estandard, ajustar la corriente de polarización mediante RV301 (CH-I) (RV302 (CH-D)) de manera que el nivel de frecuencia esté dentro del estandard.
   - Subir el nivel en la gama de alta frecuencia..... Incrementar la corriente de polarización.
   - Bajar el nivel en la gama de alta frecuencia..... Disminuir la corriente de polarización.
6. Después de eso, incrementar la señal grabada en la cinta virgen CrO_2 (QZZCRX) y la cinta virgen metálica (QZZCRZ) hasta 12,5kHz y ajustar de la misma manera como mencionado arriba y comprobar que el nivel de frecuencia esté dentro de la gama mostrada en la Fig. 9.

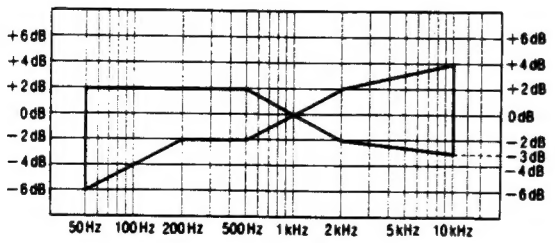


Fig. 8

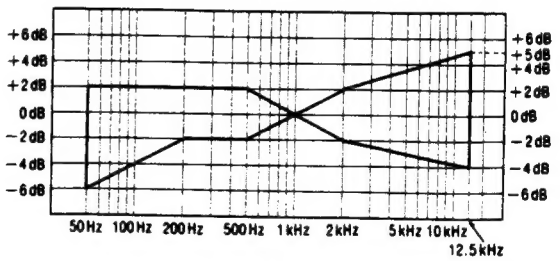


Fig. 9

Ajuste de ganancia total

1. La conexión del equipo de prueba se muestra en la Fig. 7.
2. Poner el interruptor selector de cinta en la posición "normal".
3. Colocar una cinta virgen normal (QZZCRA) y aplicar la senal de nivel de entrada de referencia (1kHz, −24dB) en la modalidad de pausa de grabación.
4. Ajustar la salida 0,42V mediante atenuador y, luego, grabar.
5. Reproducir la señal grabada en el paso 3 y comprobar que la salida esté dentro de la estandard.
6. Si no está dentro de la estandard, ajustar RV3 (CH-I) (RV4 (CH-D)) y repetir el paso (2), (3) y (4) hasta que la salida esté dentro de la estandard.

Valor estandard:	**0,4V±0,05V**

Circuito RR Dolby

1. La conexión del equipo de prueba se muestra en la Fig. 10.
2. Colocar una cinta normal y aplicar señal 5kHz en la modalidad de pausa de grabación.
3. Ajustar mediante atenuador de manera que la salida entre terminal ⑥ (CH-I) (terminal ⑲ (CH-D)) de IC401 y tierra sea 12,3mV.
4. Prender el interruptor RR y comprobar que el nivel cambia como especificado por el nivel en la modalidad de salida RR.

Valor estandard: 8±1,5dB

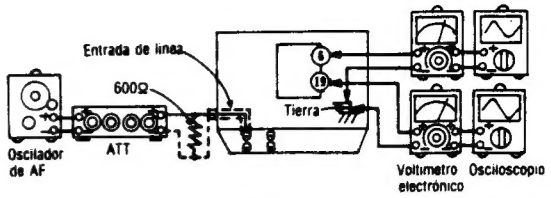


Fig. 10

Printed in Japan
860204300 Ⓜ AH/MS